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PHARMACOGNOSY
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PHARMACOGNOSY
AND
MATERIA MEDICA

For Students in Pharmacy and Practicing Pharmacists

BY

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WITH A CHAPTER ON VITAMINES AND ONE ON INSULIN
By WALTER PITZ, M.S.

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PREFACE

This text is the outgrowth of the combined experiences of two teachers of pharmacognosy, extending over a period of many years.

The guiding principle throughout the work has been to present the subject of pharmacognosy in such a way as to leave a clear conception of the important features and facts concerning plant and animal drugs in the mind of the student. To accomplish this it was deemed advisable to limit the text to the consideration of the essentials, i.e., the more practical, tangible and immediately useful aspects of pharmacognosy. Accordingly, little or no attention has been paid to the microscopic characters and details of drugs, although it has been customary for some authors to devote much space to the discussion of these features of the subject.

Intimate personal contact with a large number of graduates in pharmacy has convinced the authors that much effort on the part of teacher and student has been lost in an endeavor to teach, learn and interpret the meaning of the microscopic structure of a considerable number of drugs. This has neither been remembered nor utilized by the student after leaving college. The average student does not assimilate much more than the rudiments of many of the subjects he pursues. Therefore, if he is required to spend his time and energy in learning non-essentials, he will acquire just so much less of that which is really valuable, useful and practical, and which will make him a well-trained and competent pharmacist. Since a course in microscopical botany, or plant histology, generally forms a part of the student's college course, it seems unnecessary to repeat much of this work.

Another objective has been to make this text a ready and reliable reference for the busy pharmacist whether he be retailer, wholesaler or manufacturer. There have been included, therefore, all of the vegetable and animal drugs listed in the United States Pharmacopœia, Tenth Revision, and in the National Formulary, Fifth Edition, as well as a number of the more important non-official drugs which find frequent use in our present-day practice. The various botanical drugs have been grouped by families in a logical and systematic manner, to facilitate their study and reference to them.

The student's attention is directed to the Appendix which gives, in alphabetical order, the definitions of the therapeutic terms employed. Similarly, there is included a list of commonly used botanical terms with definitions.

The authors' thanks are hereby extended to those who have contributed aid, material, information, cuts or illustrations used in this volume. Their special thanks are due to Frederick Stearns and Company for the use of drug materials and facilities for making many of the illustrations; to Parke, Davis and Company and McCormick and Company for a number of excellent illustrations; and to others for individual photographs, prints or cuts. Credit is given those friends in the text. Grateful acknowledgment of various favors, encouragement and help is made to Walter Pitz, M.S., and George H. Wood, M.D., of the scientific staff of Frederick Stearns and Company.

H. C. W.
W. H. B.

CONTENTS

CHAPTER PAGE

I. Introductory 1
II. Thallophytes 9
III. Bryophytes and Pteridophytes 24
IV. Spermatophytes 28
V. Coniferæ and Pinaceæ 30
VI. Liliaceæ 51
VII. Iridaceæ 68
VIII. Dioscoreaceæ 73
IX. Palmæ 75
X. Gramineæ 80
XI. Zingiberaceæ 88
XII. Orchidaceæ 96
XIII. Dicotyledons—Fagaceæ 102
XIV. Betulaceæ 107
XV. Moraceæ 109
XVI. Ulmaceæ 117
XVII. Piperaceæ 119
XVIII. Polygonaceæ 125
XIX. Chenopodiaceæ 130
XX. Phytolaccaceæ 132
XXI. Lauraceæ 134
XXII. Canellaceæ 142
XXIII. Berberidaceæ 144
XXIV. Menispermaceæ 149
XXV. Myristicaceæ 154
XXVI. Ranunculaceæ 158
XXVII. Monimiaceæ 170
XXVIII. Papaveraceæ 172
XXIX. Fumariaceæ 179
XXX. Cruciferæ 181
XXXI. Guttiferæ 185
XXXII. Sterculiaceæ 187
XXXIII. Malvaceæ 192
XXXIV. Salicaceæ 200
XXXV. Geraniaceæ 204
XXXVI. Meliaceæ 206
XXXVII. Linaceæ 208
XXXVIII. Erythroxylaceæ 212

CHAPTER PAGE
XXXIX. RUTACEÆ 215
XL. ZYGOPHYLLACEÆ 229
XLI. SIMARUBACEÆ 231
XLII. BURSERACEÆ 234
XLIII. ANACARDIACEÆ 236
XLIV. SAPINDACEÆ 239
XLV. THEACEÆ 241
XLVI. FLACOURTIACEÆ 245
XLVII. POLYGALACEÆ 247
XLVIII. CELESTRACEÆ 250
XLIX. RHAMNACEÆ 252
L. EUPHORBIACEÆ 257
LI. PEDALIACEÆ 268
LII. UMBELLIFERÆ 270
LIII. HAMAMELIDACEÆ 284
LIV. MYRTACEÆ 288
LV. GRANATACEÆ 300
LVI. THYMELIACEÆ 303
LVII. ROSACEÆ 305
LVIII. SAXIFRAGACEÆ 321
LIX. LEGUMINOSÆ 323
LX. ARISTOLOCHIACEÆ 351
LXI. SANTALACEÆ 354
LXII. ERICACEÆ 356
LXIII. CORNACEÆ 359
LXIV. STYRACEÆ 361
LXV. OLEACEÆ 364
LXVI. GENTIANACEÆ 370
LXVII. LOGANIACEÆ 374
LXVIII. APOCYNACEÆ 382
LXIX. CONVOLVULACEÆ 386
LXX. HYDROPHYLLACEÆ 391
LXXI. SOLANACEÆ 393
LXXII. SCROPHULARIACEÆ 405
LXXIII. LABIATÆ 413
LXXIV. LOBELIACEÆ 426
LXXV. CUCURBITACEÆ 428
LXXVI. RUBIACEÆ 433
LXXVII. CAPRIFOLIACEÆ 444
LXXVIII. VALERIANACEÆ 448
LXXIX. COMPOSITÆ 450
LXXX. ASCLEPIADACEÆ 469
LXXXI. JUGLANDACEÆ 472
LXXXII. CACTACEÆ 474
LXXXIII. MYRICACEÆ 476
LXXXIV. DORSERACEÆ 478
LXXXV. PASSIFLORACEÆ 480
LXXXVI. ARALIACEÆ 482
LXXXVII. TURNERACEÆ 484

CHAPTER PAGE
LXXXVIII. VERBENACEÆ and ARACEÆ 486
LXXXIX. Animal Drugs 488
XC. Vitamines 522
XCI. Insulin 526

APPENDIX
I. GLOSSARY OF MEDICAL TERMS 529
II. GLOSSARY OF BOTANICAL AND ZOOLOGICAL TERMS 549

INDEX 559

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A GUIDE TO PRONUNCIATION

Key to the use of diacritical marks in showing the proper pronunciation of terms employed in this text.

ā should be sounded as the	a in lābor or fāte.
â	a in shâre or câre.
ā̇	a in senā̇te or delicā̇te.
ä	a in fäther or färm.
ă	a in făt or răt.
ȧ	a in sofȧ or ideȧ.
ē should be sounded as the	e in ēve or mēte.
ē̇	e in ē̇vent or dē̇pend.
ĕ	e in ĕnd or sĕnd.
ẽ	e in convẽrt or pervẽrt.
ī should be sounded as the	i in īce or sīght.
ĭ	i in ĭll or pĭty.
ō should be sounded as the	o in ōld or bōld.
ô	o in lôrd or ôrb.
ŏ	o in ŏdd or nŏd.
ō̇	o in ō̇bey or ō̇bedience.
o͞o	oo in mo͞on or no͞on.
ū should be sounded as the	u in ūse or tūne.
û	u in fûrl or cûrl.
ŭ	u in stŭb or tŭb.
ū̇	u in ū̇nite or ū̇nit.

PHARMACOGNOSY

CHAPTER I

INTRODUCTORY

Pharmacognosy is that branch of materia medica which treats of the structures, properties and uses of the crude animal and vegetable drugs. It includes a study of the botanical structures and classifications, and of the physical and chemical properties sufficient to enable the student to recognize drugs and to distinguish between good and spurious samples. The word *pharmacognosy* is derived from the Gr. "pharmakon," *a drug*, and "gnosis," *a knowing*, and signifies *a knowledge of drugs.*

The word *drug* comes from the Anglo Saxon "drugan," *to dry*, and formerly meant *a dried medicinal plant* or herb. By extension, however, the term has come to include all the animal, vegetable and mineral substances that are used in the composition or preparation of medicines. The term *drug*, therefore, refers to the crude material, while the term *medicine*, is applied to the finished product.

Materia medica is that branch of medical science which treats of the nature and properties of all the substances, animal, vegetable and mineral, that are employed in the cure or alleviation of disease. In its more restricted sense, as here employed, it has to do with the sources of drugs, their composition, forms and relationships to other drugs, but more particularly with their properties, uses and doses.

Drugs are derived from many sources. They may be of animal, vegetable or mineral origin. A great many of our modern drug substances are made synthetically in the chemical laboratory where they are prepared from other and simpler compounds; indeed, many principles occurring naturally in plant or animal tissues are duplicated in this way. In some instances the artificial product is not alone the complete equal of the substance elaborated in nature, but can be produced in unlimited quantity and at a much more reasonable price. An example or two will suffice to illustrate this point. Vanilla beans contain about 2 per cent of vanillin, the principal odorous constituent, upon which the value of vanilla as a flavoring agent depends in large measure. Frequently there is a world shortage of vanilla beans for immediate normal demands. If we were dependent upon them as our only source of vanillin, there would be left a still smaller supply, if any, available for the purposes for which the beans themselves are used. As it is, however, vanillin is made in relatively large amounts from coniferin, eugenol, isoeugenol, protocatechuic aldehyde, etc. A similar case is that of coumarin, which is a natural constituent of tonka beans and is prepared synthetically from salicylaldehyde, the aldehyde of salicylic acid. As an example of an active constituent of an animal drug may be cited the case of epinephrine which was formerly obtained exclusively from the suprarenal glands of certain animals, but which is now prepared synthetically in the chemical laboratory.

Crude drugs come to us from all the ends of the earth. Probably there is no country or inhabited island so small that it does not produce some substance of medicinal value. Some regions are so remote from the usual routes of commerce that valuable drugs occurring there are exported in very limited quantities or find no outlet beyond the local market.

The great bulk of the drugs used in the United States is imported from other countries. This is not due to adverse climatic or soil conditions, or to any inability on the part of our people to develop a drug-growing industry, but rather to the high cost of labor. Whereas a Chinese coolie works from sun-up to sun-down for from eight to ten cents, an American working man commands a wage thirty to fifty times as high for a shorter day.

Another factor enters into this consideration and that is the fact that surprisingly small amounts of many of the drugs are used throughout this country. Production, to be economical, must be conducted on a large scale with labor-saving devices. In order to produce drugs in such quantities as the market could absorb, many small plots would have to be planted, each to an individual drug. Each would have to be cultivated differently, since each requires its own kind of soil, food, moisture and environment as to shade, sunlight, supports, etc. Furthermore, since they mature at different seasons and require many methods of collection, sorting, drying and storing, and since all of these circumstances defeat economical, large-scale production, the problem seems to be an insurmountable one.

Many of our common drugs are leaves, roots, bark, seeds, fruit or flowers. A laborer may work hard all day to gather a few pounds of a native drug of this sort. All drugs contain more or less moisture at the time of collection, and most of this must be removed by drying in the sun or by artificial heat. A lot, consisting of one hundred pounds of such a drug at the time of collection, may dwindle to eight or ten pounds on drying, or it may make seventy or eighty pounds, depending on circumstances. This necessary shrinkage accounts, in large measure, for the high price of many of the plant drugs.

Active constituents are present in many drugs in small and varying amounts. While cloves may yield as high as 18 per cent of volatile oil, a great many other oil-bearing drugs yield but one-tenth of one per cent of oil.

In studying the vegetable drugs, we find that we must adopt some systematic arrangement of plants into groups that will facilitate the establishment of their identity, relationship, properties and uses if we are to become acquainted with any considerable number of the two hundred thousand or more distinct species.

Two systems of classification have been devised to serve this purpose. One, the Linnean, or *sexual system*, devised by the great Swedish naturalist, Linnæus, has been in use for about a century. It is purely an arbitrary and artificial system based upon obvious external arrangements of the floral organs, and, while it makes the establishment of the identity of a given plant easy and convenient, it fails to show its true relationship to other plants.

This system groups all known species of plants into twenty-four classes. The phanerogams, or *flowering plants*, constitute twenty-three of these classes, the division being made according to the number and arrangement of the floral organs. The cryptogams, or *flowerless plants*, constitute the one remaining class. So, while it is easy to identify any given plant by use of the Linnean system, this system must necessarily fail to serve our purpose in a work of this kind, since it gives us no clue as to the habits or relationships of plants, or to what we may expect as to their constituents and medicinal properties.

The *natural system* of classification, on the other hand, is an attempt to group the various plants into classes according to their true relationships to one another. There are several so-called natural systems of classification, because all botanists do not agree upon all points of interpretation of structures, and thus many plants are differently classified by different writers; but these discrepancies are few compared with the number of principles upon which all do agree.

The first attempt at a natural classification of plants was made in 1682 by an Englishman named John Ray. The real father of the system, however, was a Frenchman by the name of A. L. de Jussieu, who, in 1870 arranged all the plants then known into one hundred families, describing them so accurately that nearly all have been incorporated without change into the later systems.

This plan of grouping divides the plant kingdom into *divisions,* the divisions into *subdivisions,* the subdivisions into *classes,* the classes into *orders,* the orders into *families,* the families into *genera,* and the genera into *species.* The species consists of all plants of a given kind and is the lowest recognized division of the plant kingdom. Thus, when the plants of two or more species are alike in their essential characteristics, differing only in some minor particular, they are said to form a *genus,* and in like manner genera that closely resemble each other are grouped together to form a *family,* and so on, so that as we ascend the scale the similarity between the plants composing the particular group becomes less and less pronounced.

It was formerly customary among botanists to divide the plant kingdom into two subkingdoms, placing all the flowering plants in one group called the *phanerogams,* or *spermophytes,* and the non-flowering plants in another group called the *cryptogams,* or *sporophytes.* At present it is customary to make four divisions, namely, the thallophytes, the bryophytes, the pteridophytes and the spermatophytes. Thus the old division of sporophytes has been subdivided into the thallophytes, the bryophytes and the pteridophytes. The reason for this division is that the plants of the thallophytes are developed from the spores in a different way from those of the other two divisions. The differences will be discussed under their respective headings.

ORIGIN OF BOTANICAL NAMES

The botanical names of plants usually consist of two words. The first is the name of the genus under which the plant is classified, and is called the *generic name.* The second is the name of the species, and is known as the *specific name.* Both names, with few exceptions, are either of Latin origin, or, if borrowed from other languages, are given Latin forms. Latin is chosen because it is a dead language and therefore not subject to change. It is the language of science throughout the civilized world. Thus the scientific, or botanical, name of a given plant will be found to be the same wherever we may go.

It has frequently happened that a given species of plant has been discovered by different botanists at approximately the same time, their descriptions and reports appearing simultaneously. Naturally each botanist would give the plant a different specific name since specific names are nearly always descriptive of some characteristic of the plant, whether of appearance, peculiarity of growth or form, or perhaps of some real or fancied medicinal property it may possess. The locality of growth, the name of the discoverer himself, or that of some noted botanist has frequently been used as the specific name, so that it would be a rare coincidence indeed if any two discoverers should give a plant the same specific name. In order to avoid confusion where such cases occur and to give each individual credit for the work he has done, or for the discovery he has made, it is customary to follow such botanical names by the name of the discoverer. Accordingly, we find instances where the same plant will be known by two or more specific names, each followed by the name of the botanist who so designated it. For example, we have the Cypripedium, called Cypripedium *hirsutum* by Miller, and Cypripedium *pubescens* by Willdenow. There is also the wild cherry, called Prunus *serotina* by Ehrhart and Prunus *virginiana* by Miller.

When a new plant is discovered, the first work of the botanist is to classify it as far as possible according to its true relationship, i.e., to place it in the proper family, genus, etc. If it belongs to any known genus, he merely gives it a specific name, and his own name is appended in order to give him credit for the discovery. If it does not belong to any known genus, he lists it under the proper family and gives it both a generic and a specific name.

It has been stated already that specific names are descriptive in some way either of the plant itself or of the place where it is found, or they are given to perpetuate the name of some person, either the discoverer of the plant or some scientist whom he wishes to honor. As examples, the following may be mentioned: The specific name of Rhamnus Purshiana is a Latinized form of the name of the botanist, Fred Pursh, who lived during the early part of the last century. The specific name of the beech, Fagus silvatica, implies that the tree grows in woodlands. The specific name of the poke root, Phytolacca decandra, is derived from the Gr. "deka," *ten*, and "andros," *stamens*, because each flower has ten stamens. Further examples will be noted under the various drugs which follow.

Grammatically, the generic name is regarded as a proper noun and is, therefore, always begun with a capital letter. The specific name is usually begun with a small letter, but when derived from a proper noun, as from the name of a person, city, or country, it is usually capitalized. Also, if it was at one time used as the generic name of the plant, as in the case of Atropa Belladonna, it is begun with a capital letter.

DIVISIONS OF THE PLANT KINGDOM

In this discussion, the consideration of those groups that do not furnish any medicinal plants will be carried only far enough to give the student an idea of the reasons for the classification.

In order to make the matter clear, several tables will be presented to show the natural divisions and relationships existing between plants.

To facilitate classifying and locating plants in the natural system, the entire plant kingdom is divided as follows:

Plant kingdom — Division — Subdivision — Class — Order — Family — Genus — Species.

Specifically, the plant kingdom is classified thus:

	Division	*Subdivision*	*Class*
Cryptogams (Flowerless or seedless plants)	1. Thallophytes	Algæ Fungi Lichens	
	2. Bryophytes	Liverworts Mosses	
	3. Pteridophytes	Horse-tails Club-mosses Ferns	
	4. Spermatophytes (Old name Phanerogams—seed plants or flowering plants)	Gymnosperms	
		Angiosperms	Monocotyledons Dicotyledons

Some eminent botanists follow a somewhat more extensive classification, including a division designated as the Myxophytes, or slime molds, as the lowest forms of plant life. This division is included with the thallophytes in the above tabulation.

1. THALLOPHYTA

(thă-lŏf′ĭ-tȧ)

THALLOPHYTES

This division is named from the Gr. "thallos," *a young shoot*, and "phyton," *a plant*, and includes the lowest form of plants, i.e., those having the simplest structures, sometimes but a single cell. It probably represents, to some extent, primitive types. In this group there is no true differentiation of the individual plant into roots, stem and leaves, and though the thallus may branch into various shapes or forms, the structure remains practically uniform throughout, except that certain cells or groups of cells may become specialized to perform some specific function, e.g., that of reproduction.

In the higher plants we distinguish between the vegetative organs, such as the roots, stems and leaves, which elaborate the food necessary for the existence of the plant, and the reproductive organs, which carry on the work of propagation; but in these lower plants where the structures and functions are much simpler, both may be performed by a simple cell which functions as a nutritive cell at one stage and as a reproductive cell at another.

2. BRYOPHYTA

(brī-ŏf′ĭ-tȧ)

BRYOPHYTES

There are features by which we differentiate between the thallophytes and the bryophytes, namely, by the structure of their reproductive systems and by their two phases of development. In the bryophytes the antheridium (from the Gr. "antheros," *flowery*, from "anthein," *to bloom*, from "anthos," *a flower*, and "idion," the diminutive ending, i.e., *small*), i.e., the male sex organ, is a well-differentiated, many-celled structure within which are formed the antherozoids (sperms or spermatozoids). These are ciliate and have freedom of motion in water. The archegonium, i.e., the female sex organ, is a flask-shaped structure with a sort of neck or constricted opening through which the sperm enters to fertilize the female generative cell contained therein.

3. PTERIDOPHYTA

(tĕr′ĭ-dŏf′ĭ-tȧ)

PTERIDOPHYTES

It appears likely that at one period of the world's history the plants of this division were very abundant, consisting not alone of horse-tails, club-mosses and ferns as we know them, but of large trees constituting entire forests. They have not been able to hold their own in the contest for existence but have gradually become reduced in numbers and in importance so that now they occupy a much less prominent place in vegetation except in some warm and moist regions.

There is a decided hiatus between the bryophytes and the pteridophytes. The latter are much more highly organized plants. Pteridophytes have well-developed and easily recognized external features, as roots, stems and leaves, the leaves being provided with quite an abundance of chlorophyll and with a protecting layer of epidermal cells possessing stomata. Similarly, the internal structure presents definite differentiation of cells into specialized tissue for the performance of specific functions. Thus the pteridophytes have a fibro-vascular system for mechanical support and for the purpose of conveying nourishment to the various parts of the plant.

4. SPERMATOPHYTA

(spûr′mȧ-tŏf′ĭ-tȧ)

SPERMATOPHYTES

The spermatophytes (from the Gr. "sperma," *seed*, and "phyton," *a plant*, i.e., literally, *seed plants*) constitute the third and by far the most important division of the plant kingdom. This group furnishes most of the food of the herbivorous animals and the food and clothing of man, and supplies us with nearly all of our vegetable drugs. In this group we find the finest differentiation of tissues, the highest specialization of functions and the most complicated structures; but the one great feature which distinguishes the spermatophytes from the other divisions is the fact that reproduction takes place by means of seeds rather than by spores.

Now, having noticed briefly the distinguishing features of each of the four divisions, let us take up the study of the subdivisions, classes, families, genera and species into which each of the divisions is divided. From now on, however, stress will be laid only on those groups which furnish us with medicinal drugs, since this is not a work on botany, but one on pharmacognosy, and the botanical distinctions will be employed only in so far as they aid in making the relations of the drug plants to the vegetable kingdom more easily understood.

CHAPTER II

THALLOPHYTES

Beginning, then, with the thallophytes (see table, p. 6), we find that this division includes three subdivisions: the *algæ*, *fungi*, and *lichens*. The fundamental difference between the algæ and the fungi rests on the fact that the algæ produce chloroplasts (containing chlorophyll), the little work-shops wherein they elaborate their own food, while the fungi, having no chloroplasts and therefore no chlorophyll, can not assimilate raw materials such as water, air and carbon dioxide, and must, therefore, depend upon other organisms, either plants or animals, for their nourishment.

The vegetative body of the alga may consist of but one cell. More often, however, several cells are joined together to form a filament. Also they may be joined laterally so as to form a mass of cellular tissue. Many of the algæ live in water; others in moist places, as on the bark of trees, logs, fences, or even on rocks, provided sufficient moisture is obtainable. As an example of those living in fresh water, we have the pond scums which are familiar to all; and as examples of those living in salt water, we have the seaweeds, such as kelp, dulse, sea lettuce, etc.

In addition to the chlorophyll, by which they elaborate their food, the algæ possess other color substances which may modify, or completely mask, the green of the chlorophyll. According to the colors thus produced, the algæ are divided into the following classes.

Algæ
- Cyanophyceæ (*blue-green algæ*) from the Gr. "cyanos," *dark-blue*, and "phycos," *a seaweed.*
- Chlorophyceæ (*green algæ*) from the Gr. "chloros," *light-green*, and "phycos."
- Phæophyceæ (*brown algæ*) from the Gr. "phaion," *dusky*, and "phycos."
- Rhodophyceæ (*red algæ*) from the Gr. "rodos," *rose-color*, and "phycos."

DIATOMACEÆ

One family of the algæ, namely, the *diatomaceæ* (from the Gr. "diatomos," *cut-in-two*, or *cut through*, from "dia," *through*, and "temnein," *to cut*), is of some commercial importance as well as interest, since it furnishes the *diatomaceous*, or *infusorial*, earth which has a variety of uses. The diatoms include thousands of species of one-celled algæ, which exist on moist soil, and float on fresh water and on sea water, constituting the plankton.

An interesting feature of this group is the fact that the cell walls are encrusted with silica (SiO_2), which makes them practically indestructible. They form beds of marl and strata of earth. This cell wall consists of two halves, one fitting over the other like the cover on a "shoulder" box. These are called *valves* and are often very beautifully marked by a system of dots, circles or lines which are characteristic in the various species and which produce most beautiful effects when viewed under a microscope, some of them being so accurate in detail that they afford splendid test-objects for determining the definition of lenses.

Diatomaceous, or *infusorial*, earth is made up of the skeletons, or cell walls, of these minute plants. It is employed as an absorbent of nitroglycerin in the manufacture of dynamite. It is also used in various polishing media.

The red algæ (*rhodophyceæ*) furnish two medicinal plants, namely, *chondrus*, N.F., and *agar*, U.S.P. Various other algæ are used to a considerable extent in manufacturing and in the arts.

CHONDRUS

(kŏn′drŭs)

CHONDRUS—N.F.

SYNONYMS: Irish Moss; Pearl Moss; Salt Rock Moss; Carrageen.

SOURCE: Chondrus crispus (Linné) Stackhouse, or Gigartina mamillosa (Goodenough & Woodard), J. Agardh (Fam. Gigartinaceæ).

ETYMOLOGY: Chondrus from the Gr. "chondros," *a cartilage* or *gristle*, from the fact that the fronds of the alga are cartilaginous.

Crispus, the Lat. for *crumpled*, referring to the curled appearance of the fronds.

Carrageen, the Gaelic word meaning *rock moss*.

PART USED: The dried plant.

DESCRIPTION AND PHYSICAL PROPERTIES: *Whole Chondrus:* Entire plants matted together, consisting of a slender stalk from which arises a series of dichotomously branching, more or less flattened segments, emarginate or deeply cleft at the tips; from 5 to 15 cm. in length, and 1 to 10 mm. in width; yellowish-white; translucent, frequently coated with a calcareous deposit which effervesces with hydrochloric acid; sometimes with fruit bodies or sporangia embedded near the apex of the segments (in *C. crispus*) or with sporangia borne on short tuberculated projections or stalks, more or less scattered over the upper portion of the segments (in *G. mamillosa*); somewhat cartilaginous. Odor slight, seaweed-like; taste mucilaginous, saline.

Habitat: In the Atlantic Ocean along the coasts of Europe and New England.

Discussion: This plant, which consists of a flat, slender, cartilaginous frond, from a few inches to a foot or more in length, much divided and curled, grows upon submerged rocks along the coast of Europe from Gibraltar to North Cape, but is especially abundant along the south and west coasts of Ireland and the coast of New England.

When fresh, it has a violet-red color and is firmly attached to the bottom of the sea by means of a disc. The harvesting season lasts from May until September, but most is collected during June and July. At springtide the plants can be obtained by hand, but most of the moss is gathered at ebbtide by using large iron rakes to tear it loose from the rocks and to haul it in.

The plants must be bleached for the market, and are treated as follows: First, they are spread out upon the beach and exposed to the action of the sun and dew for a period of a week or ten days. Then they are packed into hogsheads and rolled into the salt marshes to become saturated with salt water, after which they are again spread out upon the beach. These processes are alternated four or five times or until the plants have become bleached to a whitish or yellowish-white color.

Chondrus as found in the market is dry and crisp, but upon moistening it becomes cartilaginous and develops a slight seaweed odor and a mucilaginous, somewhat saline taste. The bulk of the chondrus used in this country is probably imported, owing to the inequality in the cost of labor, although it grows abundantly along our own shores. No exact figures as to the amount imported are available, since it is grouped along with several other commodities under the heading of mosses. The total amount of "mosses" imported in 1924 was 9,714,311 pounds.

Constituents: The principal constituent of chondrus is mucilage, from 55 to 90 per cent being present. Iodides, bromides and chlorides usually are present in small amounts.

Properties and Uses: Chondrus is nutrient and demulcent. The mucilage made from it is used extensively as an emulsifying agent.

Dose: 4 dr. (15 Gm.) (This dose is unofficial).

Official Preparation: N.F. V.

Mucilage of Chondrus.

AGAR

(ä′gär)

AGAR—U.S.P.

Synonyms: Agar-Agar; Japanese Agar; Japanese Gelatin; Chinese Gelatin.

SOURCE: Gelidium corneum (Hudson) Lamouroux, and other species of Gelidium and closely related algæ (Class Rhodophyceæ).

ETYMOLOGY: Agar, the Malayese name of the plant.

Gelidium from the Lat. "gelidus," *cold, frozen,* because the boiled substance becomes solidified on cooling.

Corneum from the Lat. "cornu," *horn,* referring to the appearance of the dried, shredded substance.

Rhodophyceæ from the Gr. "rodon," *rose-colored,* and "phykos," *seaweed,* i.e., the red algæ.

PART USED: The dried mucilaginous substance extracted from the plant with boiling water.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Agar:* Usually in bundles from 3 to 6 dm. in length, consisting of thin, translucent, membranous, agglutinated pieces 4 to 10 mm. in width; externally yellowish-white or brownish-white, tough when damp, brittle when dry, with a slight odor and a mucilaginous taste.

HABITAT: In the ocean along the southern and eastern coasts of Asia.

DISCUSSION: The plants yielding agar are all seaweeds belonging to the class "*Algæ.*" They are collected by the natives during the summer and fall, but the recovery of the mucilage does not take place until cold weather, usually from November to February. The plants are bleached in the sun as soon as collected; then thoroughly dried and stored until ready for the extraction process. The mucilage is extracted with boiling water, in which it is easily soluble. Upon cooling, the mucilage gelatinizes and is dried in strips varying from 10 to 25 inches in length and from the size of a small straw to nearly $\frac{1}{4}$ inch in diameter. These vary from a yellowish-white to a brownish-white in color, and possess a slight odor and a mucilaginous taste. They are very brittle when dry, but become tough and resistant when damp.

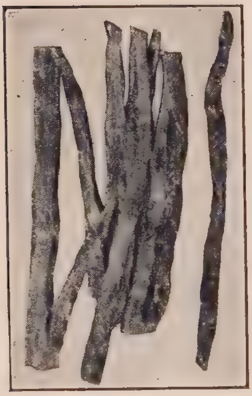

FIG. 1.—Agar.

CONSTITUENTS: Agar consists of nearly pure mucilage.

PROPERTIES AND USES: Agar has long been used as a culture medium in bacteriology. For this purpose it may be sterilized by heat without losing its nutritive properties.

The principal use of agar in therapeutics results from the fact that it holds a large amount of water, which softens the intestinal contents and lubricates the entire tract, thus favoring regularity of bowel action.

For this reason it is employed in certain forms of chronic constipation. The granular form is commonly used for this purpose and is eaten with a cereal. In Eastern countries it finds use in soups and custards as well as in the manufacture of paper and silk.

DOSE: 2½ dr. (10 Gm.).

FUCUS

(fū′cŭs)

FUCUS—N.F.

SYNONYMS: Bladder Wrack; Kelp-Ware; Sea-Wrack.

SOURCE: Fucus vesiculosus Linné, Fucus serratus Linné, Fucus nodosus Linné or Fucus siliquosus Linné (Fam. Fucaceæ).

ETYMOLOGY: Fucus, the Lat. for rock lichen, referring to its attachment to rocks at the bottom of the sea.

Vesiculosus from the Lat. "vesicula," *dim.* of "vesica," *a bladder* or *blister*, referring to the air vesicles by which it is caused to stand upright in the water.

Serratus from the Lat. "serra," *a saw*, i.e., saw-like, referring to the margins of the leaves.

Nodosus from the Lat. "nodus," *a knot*, i.e., knotty or knobbed, referring to the protuberent air vesicles.

Siliquosus from the Lat. "siliqua," *a pod* or *husk*, referring to the appearance of the leaves.

PART USED: The dried thallus.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Fucus:* Sometimes a meter in length, but usually in shorter pieces, dichotomously branched, brownish black, or slightly reddish, usually with a slight, whitish incrustation; flat, smooth from 0.5 to 4 cm. in width, margin entire or serrate with or without a stout midrib throughout, along which are irregularly disposed oval or oblong air-vesicles of varying lengths, or which may be absent; apex of thallus occasionally swollen, ovate or elliptical, about 5 mm. in diameter and bearing numerous conceptacles. Odor strongly seaweed-like; taste saline and nauseous.

HABITAT: Atlantic Ocean.

DISCUSSION: Fucus is a common seaweed, a brown alga, growing in the North Atlantic Ocean where it is found attached to rocks and other hard objects. It grows in great abundance in places, covering the surface of the water. It is collected in considerable quantities on the coasts of Scotland and France where it is used as a cattle food and fertilizer and in the preparation of kelp, which is the ash remaining after seaweeds are burned.

Constituents: Algin or alginic acid, a vegetable gelatin; mannite $C_6H_8(OH)_6$; fucose, $C_6H_{12}O_5$; a small amount of iodine and of volatile oil.

Medicinal Properties and Uses: Bladder wrack has been used in the treatment of obesity. It has been observed, however, that it is used somewhat extensively as fodder for fattening hogs. A charcoal made from it was used in treating certain forms of goiter, which use may not be irrational since even the ash contains enough iodine to be of value. Some work has been reported demonstrating that extracts of the plant have a powerful stimulating effect upon the thyroid gland. As a drug it finds very limited use at present.

Dose: 10 gr. (0.6 Gm.).

Official Preparations: N.F.

Fluidextract of Fucus, 10 m. (0.6 cc.).

FUNGI

The more common fungi, as we know them, consist of the molds, mildews, rusts, smuts, yeasts, bacteria, mushrooms, toadstools and puffballs. It has been stated already that the fungi do not contain chlorophyll. Now, since the chlorophyll grains are the little laboratories wherein the various constituents of the air and water are combined to form the plant's food materials, i.e., carbohydrates, it is evident that the fungi can not be self-supporting. Accordingly they must depend upon other organisms, either plants or animals, for their support.

Those plants that derive their food from animals or other living plants are called *parasites* (from the Gr. "parasitos," literally, *eating beside*, or *at the table of another*, from "para," *beside* or *opposite*, and "sitos," *wheat*, *grain* or *food*); and those that live on decaying animal or vegetable matter are known as *saprophytes* (from the Gr. "sapros," *rotten*, and "phyton," *plant*). The fungi are reproduced chiefly by means of asexual spores. When the time comes for the spore to develop a new plant, it produces thread-like cells, the growing point of which is at the apex. These thread-like cells are called *hyphæ* (sing., *hypha*, from the Gr. "hyphe," *a web*). As these branch and become interwoven, the mass is called a *mycelium* (from the Gr. "myces," a *mushroom*). This is the plant body proper and absorbs the food material from the host, into the substance of which it ramifies, often causing decay. Now, since the mycelium is embedded in the tissue of the plant or animal attacked, and therefore is not visible, its presence is usually unknown until the so-called *fruit bodies* are developed.

Many substances are found in the cell sap of the various fungi, but the most interesting are the *ferments*, or *enzymes* (from the Gr. "enzymos," *leavened*, from "en," *in*, and "zyme," *leaven*), which cause the various forms of fermentation (from the Lat. "fervimentum," *bubbling*, from "fervere," *to be boiling hot*, referring to the bubbling-up due to the generation of gas). The fungi are subdivided into the following classes:

FUNGI

1. Bacteria.
2. Phycomycetes, known as the *alga-fungi* from the Gr. "phykos," *seaweed*, and "myces," *fungus*, *mushroom*, because of their resemblance to the algæ.
3. Ascomycetes from the Gr. "askos," a *bladder*, and "myces," a *fungus*, i.e., a group of fungi having their spores formed in asci or spore sacs.
4. Basidiomycetes from the Gr. "basis," *base*, and "myces," *fungus*, referring to the position of the basidiospores.

The ascomycetes include the *saccharomyces*, or *yeasts* (from the Gr. "saccharon," *sugar*, and "myces," *fungus*, i.e., fungi that live on sugars. No further attempt will be made to describe the various divisions and subdivisions of the fungi since we are interested only in those that are of medicinal or economic value. Full information may be had by reference to any standard work on botany.

YEASTS

The yeasts do not produce a mycelium. The plant consists of a single cell, or a chain of cells, and reproduction takes place by a process called *budding*. This process is quite rapid under favorable conditions of food, moisture and temperature. Under certain conditions, however, such as the withdrawal of moisture or nourishment, which would otherwise prove destructive to the plant, it makes a last determined effort to perpetuate itself and, from the protoplasm of the cell, several spores, usually four, are formed by free division. Each spore then surrounds itself with a membrane and the spores are liberated by disorganization of the parent cell wall. They are able to withstand long periods of drought, considerable extremes of heat or cold, and the absence of food. This condition may be illustrated by the yeast used in bread-making, while it is in packages on the market. It is then lying dormant and many of these spores are formed. When it is used in the process of bread-making these spores grow to the normal cells of the plant and reproduction by the normal process is again restored.

Alcohol is produced by the action of a chemical ferment, or enzyme, called *zymase* (from the Gr. "zyme," *leaven*) which is developed in the actively growing yeast and which acts upon the sugar present, to form alcohol and carbon dioxide. These same products are formed in the process of making bread, but are largely driven off by the heat employed in baking, leaving the bread light and porous.

One member of the yeast family is again official and is worthy of some attention.

CEREVISIÆ FERMENTUM COMPRESSUM,

(sĕr′-ĕ̇-vĭs′i-ē fĕr-mĕn′tŭm kŏm-prĕs′ ŭm)

COMPRESSED YEAST—N.F.

Synonyms: Yeast; Brewers' Yeast; Bakers' Yeast.

Source: Saccharomyces cerevisiæ Meyen or other species of Saccharomyces (Fam. Saccharomycetaceæ).

Etymology: Saccharomyces from the Gr. "saccharon," *sugar*, and "myces," *fungus*, i.e., fungi that live upon sugars.

Cerevisiæ from the Lat. "Ceres," in classical mythology, the daughter of Saturn and Ops or Rhea, the Goddess of corn and tillage. Also applied to corn and grain in general, referring to the fact that yeast is used to cause foodstuffs made from grain, to rise.

Part Used: The moist, living cells combined with a starchy or absorbent base.

Description and Physical Properties: White or yellowish-white, soft and easily broken masses, having a characteristic, slightly sour odor, and not more than a faintly acid reaction to litmus. When examined with the microscope, numerous oidium and mycoderma cells and starch grains are visible.

Discussion: See previous paragraph, titled "Yeasts."

Properties and Uses: Besides finding extensive use in the brewing industry for the fermentation of sugar into alcohol in the manufacture of whiskey, beer, ale, stout and porter, and in bread-making, yeast has found much favor in recent years as a laxative and as an alterative in certain forms of skin affections. Because of its relatively large content of vitamine B (water-soluble B) it has been used much in digestive and nutritional disturbances.

ERGOTA

(ûr-gŏt′ȧ)

ERGOT—U.S.P.

Synonyms: Rye Smut; Spurred Rye; Cockspur Rye; Secale cornutum P.I.

Source: Claviceps purpurea (Fries) Tulasne (Fam. Hypocreaceæ) which replaces the grain of rye, Secale cereale Linné (Fam. Gramineæ).

Etymology: Ergota from the Fr. "ergot" or "argot," *a spur*, referring to the shape of the sclerotium which resembles the spur of the cock.

Claviceps from the Lat. "clava," *a club*, also referring to the shape of the sclerotium.

Purpurea from the Lat. "purpureus," *purple*, referring to the color of the sclerotium at certain stages.

Secale from the Lat. "secare," *to cut*, derived from the Celtic "sega," *a sickle*, referring to the method of harvesting the grain.

Cereale from the Lat. "cerealis," *cultivated grain*.

Sclerotium from the Gr. "scleros," *hard*, referring to the hard texture of the ergot.

Cornutum, the Lat. for "horny," referring to the hard texture of the ergot.

Part Used: The sclerotium or resting stage of the fungus.

Description and Physical Properties: *Unground Ergot:* Cylindraceous, obscurely 3-angled, tapering towards both ends, obtuse, somewhat curved, from 1 to 4.5 cm. in length and from 3 to 5 mm. thick, longitudinally furrowed; externally dark purple or dark-reddish-brown; fracture short; internally white, tinged with purple or gray; odor characteristic but free from mustiness or rancidity; taste oily, somewhat acrid, disagreeable.

Habitat: Spain, Germany, Russia, United States.

Discussion: Ergot is the sclerotium, or resting stage, of a parasitic fungus which grows upon various members of the grass family, but especially upon the rye. The fungus passes through a cycle of three stages, the first being the *sphacelia* (from the Gr. "sphakelos," *gangrene*, i.e., a gangrenous or necrosed part or mass, a slough) which starts when the rye is in blossom by taking possession of the ovary, which it gradually replaces. This replacement of the rye ovary by the fungus is more apt to occur during wet seasons and is facilitated by the fact that during the blooming of the rye a few ovaries of some of the grain heads become covered with a sweet, yellow mucus called *honey dew of rye*. Its odor repels bees, but attracts ants, beetles and flies. These insects were once thought to cause the disease, but are now known only to aid in its dissemination.

This sphacelia, after it has developed at the expense of the rye ovary, produces reproductive cells called *conidia* (Sing. *conidium*, from the Gr. "konis," *dust*) which are carried by insects to other plants. Since these conidia can germinate immediately, the disease spreads rapidly during the flowering season of the rye. After the formation of the conidia is completed, the mycelium forms a dense mass which is surrounded by a dark layer forming the *sclerotium* which constitutes the ergot as we know it. If allowed to remain on the host plant, the sclerotium drops to the ground and lies dormant until the host plant is again ready to blossom the following season, when it develops small, reddish, spherical bodies upon stalks which protrude from various parts of the sclerotium.

Just inside the periphery of these spherical heads are found bottle-shaped cavities called *ascocarps* (from the Gr. "askos," *a bladder*, and "karpos," *fruit*). Within these cavities, or ascocarps, are developed long, thread-like, one-celled spores which are shot out at the proper time and are carried by the wind to the flowers of the host plant, and the cycle of growth is again started.

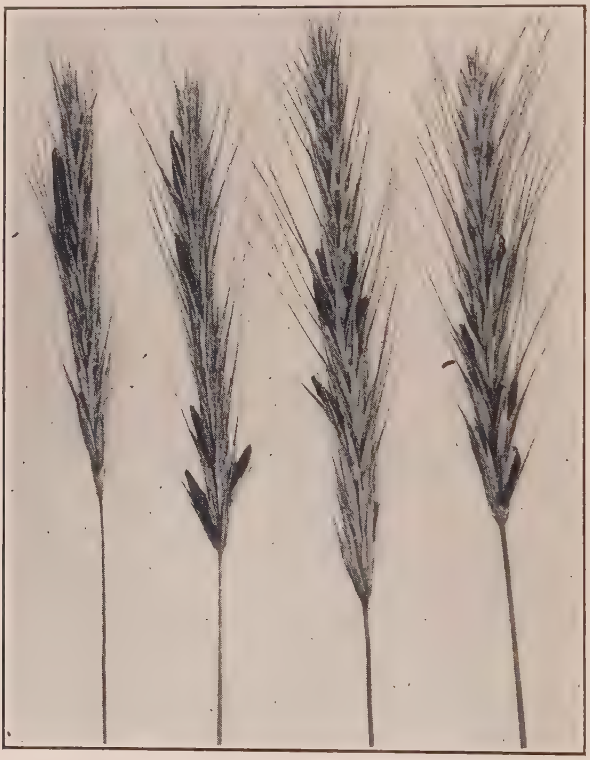

FIG. 2.—Heads of rye bearing ergot. (Courtesy of Prof. C. J. Zufall.)

Spanish ergot is considered the best commercial variety and it is thought to be best when collected before harvesting the grain. The importation of ergot for the year 1924 amounted to 170,412 pounds.

CONSTITUENTS: The chemistry of ergot has been in an unsatisfactory state for many years. More recently, however, several investigators have obtained results that appear to be concordant. Their findings indicate that the active constituents of this drug are ergotamine and ergotoxin. The former is said to possess the property of contracting the uterus, while the latter, which is known also as *sphacelotoxin* and *sphacelic acid*, produces the gangrene of the cock's comb, increases blood pressure and induces some uterine contraction.

Other less active and definitely identified constituents have been described as follows: tyramine, histamine, agamatine and acetylcholine.

Ergot contains from 30 to 35 per cent of a fixed oil which is probably at least partly responsible for the deterioration of ergot. The drug is best preserved in the form of its fluidextract.

Properties and Uses: Ergot contracts all unstriated (unstriped or involuntary) muscular tissues, being especially active on those of the uterus and bowel. The heart muscle is depressed, the pulse slowed, and the arterioles contracted. Thus the blood-pressure is increased and the secretions of sweat, urine, saliva, etc., diminished.

The contraction of the arterioles caused by ergot makes it a powerful hæmostatic in spite of the increased blood-pressure caused by it. Thus it is employed to check post-partum hemorrhage, which it does by constricting the arterioles and contracting the uterus. Because of the uterine contractions, it is also used to assist in parturition; but, since the contractions produced by ergot are continuous (tonic), while the natural labor pains are intermittent, its use is dangerous except in the hands of a competent physician.

Ergot is also employed as a hæmostatic in menorrhagia, metrorrhagia, chronic metritis and other internal hemorrhages.

Dose: 30 gr. (2 Gm.).

Official Preparation: U.S.P. X.

Fluidextract of Ergot, 30 m. (2 cc.).

AGARICUS

(ăg'à-rĭk'ŭs)

AGARIC—N.F.

Synonyms: White Agaric; Larch Agaric; Purging Agaric.

Source: Polyporus officinalis Fries (Fam. Polyporaceæ).

Etymology: Agaric from the Gr. "agarikon," *a fungus.*

Officinalis from the Lat. "officina," *a workshop*, from "opus," *work*, and "facere," *to do*, i.e., kept in the shop or store.

Polyporus from the Gr. "polys," *many*, and "poros," *pore.*

Part Used: The dried fruit-body of the fungus deprived of its outer rind.

Description and Physical Properties: *Unground Agaric:* Light, fibrous, somewhat spongy pieces of irregular shape; grayish-white to pale-brown externally; yellowish and resinous internally; fracture tough, fibrous; friable but difficult to powder. Odor faint; taste sweetish, acrid and bitter.

Habitat: Central and Southern Europe, Northern Asia.

Discussion: This is a sessile, hoof-shaped fungus found growing on the trunks of dead trees. It reaches the size of from 6 to 8 inches in breadth and 2 to 4 inches in thickness. Externally it is grayish or yellowish in color and shows many small yellowish pores beneath. It is collected in the fall or winter, deprived of the outer rind and cut into irregular pieces for the purpose of drying. These pieces appear light and spongy and have a slight odor. The taste is sweetish at first, then acrid and bitter.

Constituents: Agaricin; several resins.

Properties and Uses: This drug has been used to diminish the night-sweats of phthisis. It is thought to have a selective action on the peripheral endings of the secretory nerves supplying the sweat-glands. Its use is very limited.

Dose: 10 gr. (0.6 Gm.).

Official Preparations: N.F. V.

Antiperiodic Pills, 1 pill.
Antiperiodic Pills without Aloe, 1 pill.
Antiperiodic Tincture, 1 fl. dr. (4 cc.).
Antiperiodic Tincture without Aloe, 1 fl. dr. (4 cc.).

LICHENS

The lichens constitute a subsidiary division of the thallophytes, consisting, as they do, of both alga and fungus, so intimately associated as to appear mutually interdependent. Probably, in the strictest sense of the word, the fungus portion is parasitic on the alga portion of the lichen, but the advantages derived from this co-partnership arrangement, which is known as *symbiosis* (from the Gr. "syn," *with*, and "bioyn," *to live*, i.e., *a living together*) are mutual.

The fungus portion of the lichen furnishes the reproductive cells and draws moisture from the substratum, storing it up to be used in the time of drought, and thus averting the death of the lichen, while the alga portion, with its chlorophyll cells, is an assimilating body and elaborates the food necessary for both.

Lichens are found almost everywhere, growing on rocks, logs, trees and even on the ground. They vary considerably in color, depending upon the relative distribution of the alga and fungus portions, also upon the coloring matter, in addition to chlorophyll, that may be present in each. Some are gray, others green or brown, shading to almost black.

PARMELIACEÆ

(pär-mē′lĭ-ā′sė̄-ē)

PARMELIA FAMILY

This is a large family consisting of lichens. The thallus is foliaceous, crustaceous or fruticose.

PERSIO

(pûr′sė̄-ō)

CUDBEAR—N.F.

Synonyms: Red Indigo; Swedish Moss; Dyer's Moss.

Source: Species of Roccella DeCandolle; Lecanora Acharius, and other lichens (Fam. Parmeliaceæ).

Etymology: Persio from "persis," *a dyestuff*, origin uncertain.

Cudbear, named for Dr. Cuthbert Gordon, a Scotchman, who first brought it to notice.

Roccella, the Lat. for "archil," a violet dye obtained from several species of lichens, especially Roccella tinctoria, etc.

Lecanora from the Gr. "lekane," *basin*, and "ora," *beauty*, from the form and color of the apothecium (in lichens, the cup-shaped or disc-like form of ascocarp in which the asci are borne).

Parmeliaceæ from the Lat. "parma," *a kind of small shield.*

Part Used: A purplish-red powder prepared from the above lichens.

Physical Properties and Tests: An aqueous or alcoholic preparation of Cudbear is of a deep-red color which is rendered lighter in tint by the addition of acids, and is changed to purplish-red on the addition of alkalies.

Discussion: Cudbear is obtained from a number of lichens. In the process of manufacture they are digested for about seven days in diluted ammonia water, after which the mixture is evaporated to dryness and powdered.

Constituents: A number of chromogenes are present in these lichens. During the process described above, they are converted into nitrogenated pigments. These chromogenes are erythric acid ($C_{20}H_{22}O_{20}$), alpha-orsellic acid ($C_{32}H_{28}O_{14}$), beta-orsellic acid ($C_{34}H_{32}O_{15}$) and evernic acid ($C_{34}H_{22}O_{14}$). During the digestion process these acids are converted successively into the following substances: lecanoric acid ($C_{16}H_{14}O_7$), orsellic acid ($C_8H_8O_4$) and finally orcin ($C_7H_8O_2$). This occurs as colorless crystals, but turns red on contact with air, yielding ammonia orcein ($C_7H_7NO_3$). With alkalies this forms a beautiful red color.

Properties and Uses: Cudbear is used for coloring pharmaceutical preparations, for which it is well adapted. It is also employed to some extent in dyeing.

Official Preparations: N.F. V.
Tincture of Cudbear.
Compound Tincture of Cudbear.

CETRARIA
(sė̄-trā′rĭ-ȧ)

CETRARIA—U.S.P. VII

Synonyms: Iceland Moss; Iceland Lichen.
Source: Cetraria islandica Acharius (Lichen Islandicus Linné).
Etymology: Cetraria from the Lat. "cætra," *a small shield*, referring to the shape of the frond.
Islandica refers to the habitat, i.e., Iceland.
Part Used: The thallus.

Description and Physical Properties: From 2 to 4 inches (5 to 10 cm.) long, foliaceous, with fringed and channeled lobes, brownish above, whitish beneath, brittle and inodorous; when softened in water, cartilaginous, and having a slight odor; its taste is mucilaginous and bitter.

It should be freed from pine leaves, mosses and other lichens, which are frequently found mixed with it.

Habitat: Scandinavia, Switzerland, Germany and parts of Austria.

Discussion: This plant is not a true moss as the common name would indicate, but a lichen, the mosses being classified under the archegoniates, while we are still dealing with the thallophytes. Cetraria grows in most northern latitudes and in high mountainous regions farther south, but the principal supplies are obtained from the above-named countries. The color varies from a grayish-white to brown or red on various portions of the plant. The Department of Commerce groups cetraria, along with various other items, under the general heading of *mosses*, therefore no accurate data on the amount imported can be had. The amount of *mosses* imported during 1924 amounted to 9,714,311 pounds.

Constituents: Lichenin (lichen starch) and lichenoid (isolichenin) are the chief constituents. Cetraric acid (cetrarin) is the bitter principle present. Lichenin appears to be intermediate, chemically, between starch and cellulose and is soluble in hot water, the solution becoming gelatinous on cooling. It is not colored blue by iodine. Isolichenin resembles soluble starch, being soluble in cold water and giving a blue reaction with iodine.

Properties and Uses: Cetraria is demulcent and nutritive. The Lapps and Icelanders use cetraria as a food. They first remove the bitter principle by soaking it in water containing a little sodium carbonate; then boiling it with milk to make a porridge. They also grind it and make a sort of bread.

Dose: Ad libitum.

CHAPTER III

BRYOPHYTES AND PTERIDOPHYTES

The principal feature by which these are distinguished from the thallophytes and from each other has been mentioned. These divisions are further divided as follows:

Bryophytes	Hepaticæ (Liverworts) from the Gr. "hepas," *liver*, i.e., of liver color or shape. Musci (Mosses) from the Lat. "muscus," *moss*, i.e., moss plants.

This division yields no official drugs.

Pteridophytes	Filicales (Ferns) from the Lat. "filix, icis," *fern*, i.e., fern plants. Equisetales (Horse-tails) from the Lat. "equus," *horse*, and "sæta," *a stiff hair* or *bristle*, i.e., a horse-tail, a family of pteridophytic plants known as horse-tails, or scouring rushes, containing the single living genus, Equisetum, and constituting the order, Equisetales. Fossil remains indicate that in Mesozoic times these plants were abundant and included several arborescent genera. Lycopodiales (Club Mosses) from the Gr. "lykos," *wolf*, and "pous," *foot*, referring to the appearance of the shoots.

BRYOPHYTES

The bryophytes (from the Gr. "bryon," *moss*, and "phyton," *plant*, i.e., moss plants) show a decided advance in structure over the thallophytes, possessing as they do, some differentiation of leaves, stems and root-hairs, as well as a more complex reproductive system. None of them have true roots, but the root-hairs attach the plants to the substratum and absorb the nourishment and moisture necessary for their growth. There are no parasites or saprophytes among this group since all contain chlorophyll and are therefore self-assimilating. No member of this group is of medicinal value.

PTERIDOPHYTES

The word *pteridophyta* (from the Gr. "pteron," *wing*, and "phyton," *a plant*), liberally translated, means *fern plants*, the ferns being the most numerous as well as the most important of the series. The plant body is well differentiated into stems, leaves, roots and root-hairs. Most of the ferns have unbranched (others sparingly branched) stems. In temperate climates the stems grow under the ground, but in the tropics they often rise above ground and form scaly trunks, sometimes of considerable size. Two members, one of the filicales and the other of the lycopodiales, are of medicinal value.

ASPIDIUM

(ăs-pĭd′ĭ-ŭm)

ASPIDIUM—U.S.P.

SYNONYMS: Male Fern; Basket Fern; Knotty Brake; Bear's Paw Root.

SOURCE: Dryopteris Filix-mas (Linné) Schott (Fam. Polypodiaceæ).

ETYMOLOGY: Aspidium from the Gr. "aspidion," *a small shield,* from "aspis," *a shield,* referring to the scales that cover and protect the fruit-dots.

Dryopteris from the Gr. "dryos," *oak,* and "pteris," *wing,* signifying *under the wings of the oak,* because the ferns grow naturally in the shade.

Filix-mas from the Lat. "filix," *a fern,* and "mas," *male,* or *masculine,* referring to the asexual fructification.

Marginalis from the Lat. "margo," *margin,* i.e., the fruit dots are near the edge or margin of the frond.

Polypodiaceæ from the Gr. "polypodion," dim. of "poly pous," *many footed,* from "polys," *many,* and "pous," *foot.*

PART USED: The dried rhizome.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Aspidium:* Rhizome, 1 to 3 cm. in thickness, cylindraceous and nearly straight, or curved and tapering toward one end, usually split longitudinally, roughly scarred with remains of the stipe bases, or bearing several coarse, longitudinal ridges and grooves. Stipes, nearly cylindrical, but tapering toward one end, nearly straight or somewhat curved, 3 to 5 cm. in length, about 8 mm. in thickness; externally brownish black, or if peeled, light brown; fracture short; internally pale green, spongy and exhibiting an interrupted circle of from 6 to 12 small vascular bundles; odor slight; taste sweetish, astringent, bitter and acrid.

HABITAT: North and South America, Northern Asia, Europe, Northern Africa.

DISCUSSION: Dryopteris Filix-mas has a perennial, horizontal root, or rhizome, from which a tuft of annual leaves, or fronds, arise each spring. These grow from 1 to 4 feet in height. It is found along the Rocky Mountain chain from British Columbia, through the United States, Mexico, Venezuela and as far south as Peru. In the eastern portion of the United States it is replaced by the Dryopteris marginalis which was official in the U.S.P. IX. This grows to the height of 1 or 2 feet.

Aspidium grows best in moist, shady woodlands and in protected recesses in the mountains where the accumulation of decayed vegetable matter makes a most favorable soil. The rhizome should be collected in the fall at the end of the growing season. It should be stripped of the roots and dead portions and carefully dried at a temperature not exceeding 70° C. It should be kept in tightly closed containers and protected from the light since exposure to sunlight and air hastens its deterioration. It should not be kept longer than one year in this form as it is prone to deteriorate on long standing even if well protected. Deterioration may be detected by a loss of the greenish color. Since aspidium is rarely administered in any other form than the oleoresin, it would be better if the drug were extracted soon after collection since the oleoresin does not deteriorate on standing.

CONSTITUENTS: Fixed oil 6 to 7 per cent, filicic acid 5 to 10 per cent, volatile oil, resin. All of the above constituents are contained in the oleoresin. The filicic acid usually separates out in the form of crystals, so when this is the case, the oleoresin should be warmed and thoroughly mixed before dispensing.

PROPERTIES AND USES: Aspidium is one of the most valuable and active of the tæniafuges. That it was so employed in ancient times is confirmed by the writings of Galen, Pliny, Dioscorides and Theophrastus. It seems to have fallen into disuse, however, until about the year 1775, when the widow of a famous Swiss physician sold to King Louis XVI, of France, a secret remedy for tapeworm which her husband had employed with success in his practice. An analysis was made of the sample supplied and it was found to be the powdered root of the male fern.

OFFICIAL PREPARATION: U.S.P. X.

Oleoresin of Aspidium, 1 dr. (4 Gm.).

Caution: Single dose, once a day.

LYCOPODIUM

(lī′kŏ-pō′dĭ-ŭm)

LYCOPODIUM—U.S.P.

SYNONYM: Vegetable Sulphur.

SOURCE: Lycopodium clavatum Linné (Fam. Lycopodiaceæ).

ETYMOLOGY: Lycopodium from the Gr. "lykos," *wolf*, and "pous," *foot*, referring to the appearance of the shoots.

Clavatum from the Lat. "clavatus," *club-like*, from "clava," *a club*, referring to the appearance of the fertile spikes.

PART USED: The spores.

DESCRIPTION AND PHYSICAL PROPERTIES: A light, yellow, very mobile powder, odorless and tasteless; the spores shaped as a three-sided pyramid with convex base, from 0.025 to 0.040 mm. in diameter; the outer surface reticulate, the reticulations being polygonal and formed by straight-sided delicate ridges, which form a delicate fringe at the edges of the spore; when viewed with the rounded surface of the spore on the under side, a distinct triangular marking is seen, formed by the edges of the flat surfaces of the spore.

HABITAT: Europe, Asia, North America.

DISCUSSION: Lycopodium clavatum is a moderate sized, perennial, herbaceous plant found growing in many northern latitudes. It has a creeping stem several feet in length and thickly covered with smooth flat leaves not unlike the true mosses. The numerous branches terminate in from one to four spikes each. These are thickly covered with scales at the base of which are borne little kidney-shaped receptacles containing the spores. These little receptacles, called "*sporangia*" (Sing. *sporangium*, from the Gr. "sporos," *a sowing, seed*, and "aggeion," *a receptacle*) dehisce longitudinally and discharge the numerous spores which they contain.

Collection of the lycopodium is made by placing the fruit-heads in sieves and rubbing them so the spores may fall through the meshes. Lycopodium has often been adulterated in the past, the most common substances used being the pollen of the various conifers, starches, dextrin, sulphur and turmeric. However, the spores are so characteristic in shape and appearance that the microscope readily reveals any substitution. The importation of lycopodium for the year 1924 amounted to 10,559 pounds.

CONSTITUENTS: About 47 per cent of a bland fixed oil, yellow in color and similar to almond oil.

PROPERTIES AND USES: Lycopodium is a mechanical lubricant, protective and siccative, therefore is used as an absorbent application to protect tender and chafed surfaces.

CHAPTER IV

SPERMATOPHYTES

THE plants thus far considered are all reproduced by means of spores and by some botanists are grouped into one subkingdom called "*sporophytes*," or "*cryptogams*" (from the Gr. "kryptos," *hidden*, or *secret*, and "gamos," *marriage*, because the manner of their reproduction was not understood). The spermatophytes are also known as "*phanerogams*" (from the Gr. "phaneros," *visible* or *known*, and "gamos," *marriage*) the part played by the pistillate and staminate organs having been recognized at a very early date.

The spermatophytes are also known as "*flowering plants*" as contrasted with the two subkingdoms already considered which are *flowerless plants*. The spermatophytes are very highly specialized structurally and furnish by far the greater number of our vegetable drugs, as well as serving many other useful purposes. Nearly all of the spermatophytes are self-supporting, there being a few parasites, e.g., the mistletoe, and some saprophytes as the orchid, neottia. The spermatophytes are subdivided into two groups, the basis of the subdivision depending upon whether the seeds are produced within closed carpels or are exposed.

$$\text{Spermatophytes}\begin{cases}\text{Gymnosperms}\\ \text{Angiosperms}\end{cases}$$

GYMNOSPERMS

The name *gymnosperm* (from the Gr. "gymnos," *naked*, and "sperma," *seed*, from "speirein," *to sow*) was given because the ovule is borne at the base of an open scale and is thus exposed, as is also the seed which is developed therefrom. The members of this group are mostly shrubs or trees, and since they do not shed their leaves periodically, they are called *evergreens*.

Anatomically, the stems of the gymnosperms are closely related to those of the angiosperms, i.e., they have a pith, a cambium zone and medullary rays, but possess no true wood cells. Also, in place of the large conducting vessels of the angiosperms, the gymnosperms have tracheids with bordered pits, a characteristic which serves to distinguish them from the angiosperms. The flowers of the gymnosperms are never showy or nectar-bearing. Therefore they must depend upon the wind to distribute the pollen which, for that reason, is dry and is produced in large quantities. The gymnosperms are divided into the following classes:

Gymnosperms
- Cycadaceæ (Fern palms) from the Gr. "cycas" (coicas), the accusative plural of "coiz" the name of an Egyptian palm (the sago palm).
- Coniferæ from the Lat. "conus," *a cone,* and "ferro," *to bear,* i.e., *cone-bearing.*

CYCADACEÆ

The members of this group are found for the most part in the tropics and subtropics. The leaves form a *tuft,* or *crown,* at the top of the unbranched trunk, or stem. There are no plants of medicinal value among the cycadaceæ.

CHAPTER V

CONIFERÆ AND PINACEÆ

To this class, one group of which is known as the *pinaceæ*, belong the pines, firs, larches, cedars, junipers, hemlocks, spruces, yews and cypresses. A few of the members are shrubs, but most of them are trees of moderate or large size. The fruit is usually a cone. The leaves are simple, often needle-like, and nearly all members produce terebinthinate secretions.

SABINA

(sā-bī′nȧ)

SAVIN—U.S.P. VIII

Synonym: Savine Tops.

Source: Juniperus Sabina Linné (Fam. Coniferæ).

Etymology: Juniperus from the Celtic "jeneprus," *rough* or *thorny*, referring to the character of the leaves.

The name *Sabina* was given in honor of the ancient Sabines, a people of Italy who used the drug medicinally.

Part Used: The tops, i.e., the extreme ends of the young branches, representing one season's growth.

Description and Physical Properties: Short, thin, subquadrangular branchlets bearing leaves which are rather dark green, in four rows, opposite, scale-like, ovate-lanceolate, more or less acute, appressed, imbricated, having on the back a shallow groove containing an oblong or roundish gland; odor peculiar, terebinthinate; taste disagreeable, resinous and bitter.

Habitat: Europe, Northern Asia, North America. Collected commercially in Germany, Switzerland, France, Spain and Italy.

Discussion: Juniperus Sabina is a procumbent or erect evergreen shrub growing from 3 to 15 feet in height and having many erect branches. The ends of the young twigs are collected in the spring, since at that season of the year they contain a maximum of volatile oil. These growing ends are closely covered with small scale-like leaves which are of a deep-green color when fresh, but become much faded on drying.

Constituents: Volatile oil 2 to 10 per cent, resin, tannin.

Properties and Uses: Savin, locally applied, is irritant and stimulating.

The drug itself finds limited use in medicine. The activity resides in the volatile oil which has found use in various uterine troubles in which it acts as an emmenagogue in amenorrhœa, dysmenorrhœa and atonic menorrhagia.

NAVAL STORES

The term naval stores has long been applied to various products of the coniferous trees that are used in ship building and ship management. The term as now employed includes all the crude and chemical products from this important family of plants. The naval stores are classified under six groups as follows:

1. Turpentine Group: The products belonging to this group are secretions, for the most part pathological in nature, and are either liquid or semi-solid in form. They consist of resins and volatile oils. Common turpentine may be regarded as the type of the group.

2. Oil of Turpentine Group: The members of this group consist of the volatile oils of the conifers, and are obtained by distilling either the oleoresins secured from the plants as in the case of turpentine, or by destructive distillation from the leaves, twigs, stumps, roots and branches directly. Oil of turpentine is the type of this group.

3. Colophonium Group: (from the Gr. "kolophonios," *of* or *pertaining to Kolophon,* an ancient city in Ionia). The members of this group are solid resinous products and are obtained from the oleoresins by the removal of the volatile oils by distillation. Common rosin is the type of the group.

4. Resina Pini Group: The members of this group are resinous products which concrete on the trees from natural exudations or from wounding, and from which the volatile oils have mostly evaporated at ordinary temperatures. Canada pitch may be taken as representative of this group.

5. Tar Group: The members of this group are thick semi-liquid products made by the destructive (dry) distillation of coniferous woods. Pine tar is the type of the group.

6. Pitch Group: The substances belonging to this group are solid residues left after distilling off the more volatile portions of the various tars. Common black pitch, the residue left from the distillation of pine tar, is the type of the group.

We will now consider these various groups in detail.

TURPENTINE GROUP

TEREBINTHINA
(tĕr-ē-bĭn′thĭ-nȧ)

TEREBINTHINA—N.F.

Synonyms: Oleoresin of Turpentine; "Gum" Turpentine; Crude Turpentine; Common Frankincense.

Source: Pinus palustris Miller, and other species of Pinus (Fam. Pinaceæ).

Etymology: Pinus, the Lat. for "pine tree."

Terebinthina from the Gr. "terein," to *incise*, because the product is obtained by incising the tree.

Part Used: The oleoresin obtained by wounding the tree.

Description and Physical Properties: Turpentine occurs in yellowish, opaque masses, lighter internally, sticky and more or less glossy, brittle in the cold. Odor and taste characteristic.

Habitat: United States and Europe.

Discussion: Pinus palustris is a very large tree growing in the dry sandy soil from Virginia to the Gulf of Mexico. The leaves are about a foot in length, bright green in color and occur in bunches at the ends of the branches. It is called *Long Leaf Pine, Yellow Pine, Southern Pine, Hard Pine, Georgia Pine* and *Pitch Pine.* This species furnishes by far the greater part of the turpentine and pine tar made in this country.

Pinus Tæda, Linné, the *Loblolly Pine* of the southern states also furnishes turpentine and tar. It is abundant in Virginia where it occupies the land that has been exhausted by cultivation. It often exceeds 80 feet in height and has a trunk 2 or 3 feet in diameter. The leaves are 6 to 10 inches in length, light-green in color and occur in sets of three. It produces a large yield of turpentine, rich in resin, but poor in volatile oil.

Formerly large quantities of turpentine were collected in New England, but the source of this valuable product in that section has long since been exhausted. At present the supply of turpentine nearly all comes from Virginia, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas and the Carolinas.

The oleoresin exists naturally in the wood in schizogenic canals (from the Gr. "schizein," *to split*, or *cleave apart*, and "genesis," *the beginning*, from "gignesthai," *to be born*, i.e., caused by splitting or breaking up of the cellulin of the cell walls) and is to that extent, of course, a natural or *physiological* secretion, but the amount secreted may be greatly increased by wounding the tree. This additional amount of oleoresin is formed by a metamorphosis of the cellulose of the cell walls and is, therefore, an abnormal, or *pathological* product, although it is identical, physically and chemically, with the natural secretion of the tree.

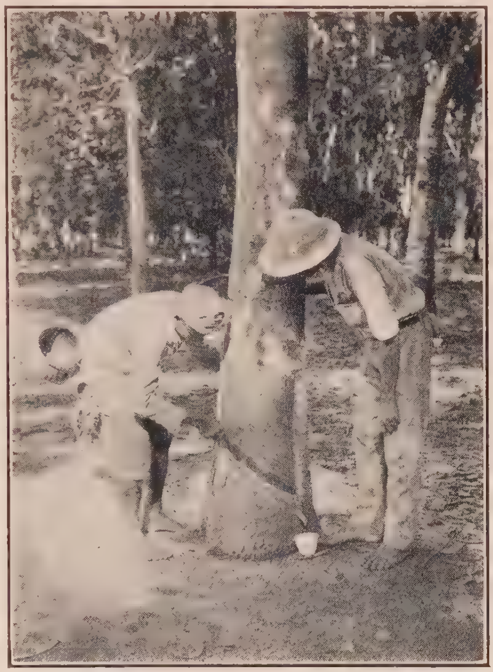

Fig. 3.—Modern method of turpentining. (Courtesy of the United States Department of Agriculture.)

During the winter months one or more cavities are cut into the trunk of the tree, about a foot above the ground. These cavities, or "*boxes*," as they are called, hold about three pints and extend downward into the heart of the tree. For a space of three or more feet above these boxes, the tree is deprived of its bark and the wood scraped to the depth of one-fourth to one-half inch. About the middle of March the oleoresin begins to flow from the wounded surface. This flow continues throughout the summer and autumn, and every eight or ten days the wound is freshened by the removal of a thin layer of wood to keep the flow active. As the oleoresin collects in these boxes it is removed by means of a strong dipper with which it is transferred to barrels and is then hauled to the still where the volatile oil is removed by distillation, leaving the rosin behind.

The following season these wounds are again freshened and more oleoresin obtained. The product collected from a tree during the first season is known as the *virgin dip*, while the second year's yield is called the *yellow dip*. That portion which hardens on the tree at the edges of the wound is known as the *scrapings*. The volatile oil obtained from the scrapings is smaller in amount and the rosin darker in color than that of the regular dip.

The method described has been in vogue in this country for many years and in fact was the only one employed until about twenty-five years ago. About that time a new and more economical method was introduced in some of the more progressive sections and has gradually replaced the old one. Instead of cutting the box into the heartwood of the tree, the box serving as a receptacle for the oleoresin, the surface is scarified, in the main, as already stated, but a metal or clay pot is attached to the tree to receive the flow. The latter is guided into the pot by means of metal gutters of several designs fastened into the tree at the lower end of the scarified surface. As the flow ceases or slows up materially, the gutters and pot are raised so that the oleoresin does not have to flow over so long a surface to enter the pot. The loss of volatile oil is therefore much less, the resin is lighter in color, less oleoresin adheres to the tree and therefore affords less fire hazard. The trees are not weakened as in the older method and for that reason are not so readily blown down by the wind. Ten years ago it was stated that at least 75 per cent of the trees were being turpentined according to this method or some slight modification of it.

The method employed in France is a good, scientific and economical one. It is known as "*bleeding-alive*," and is conducted as follows: A strip of the tree a few inches in width and extending from near the ground to a height of twelve or fifteen feet is deprived of its bark and a thin layer of wood. The workmen remove just as thin a shaving of the wood as possible and renew the wound every few days during the season in order to keep the oleoresin flowing. It flows into vessels placed at the base of the strip and is collected frequently thus insuring a large yield of volatile oil. After several seasons the tree is allowed to rest and the wound heals over by the formation of new layers of wood and bark.

Another turpentine oil appeared on this market some years ago made by either steam or destructive distillation of pine stumps, roots, chips, dead or fallen timber. In a general way its characters are very similar to those of the official oil of turpentine but differ in odor and taste, being somewhat more mellow, or less harsh than the official oil. It is used largely in the manufacture of paints and varnishes and for a variety of mechanical purposes.

Notwithstanding the enormous production of turpentine in this country, a small amount is annually imported. In 1924 this amounted to 447 barrels.

CONSTITUENTS: Resin 70 to 85 per cent, volatile oil 15 to 30 per cent. Turpentine is used principally for the recovery of the volatile oil and rosin. A small amount enters into the manufacture of plasters.

OFFICIAL PREPARATION: N.F.V.

Compound Rosin Cerate.

TEREBINTHINA CANADENSIS

(tĕr-ē-bĭn′thĭ-nȧ kăn′ȧ-dĕn′sĭs)

CANADA TURPENTINE—U.S.P. VIII

Synonyms: Balsam of Fir; Canada Balsam.
Source: Abies balsamea Linné (Miller) (Fam. Coniferæ).
Part Used: The oleoresin.

Description and Physical Properties: Viscid, pale-yellowish or greenish-yellow, transparent; odor agreeable; taste terebinthinate, bitter, and slightly acrid. When exposed to the air, Canada Turpentine gradually dries and forms a transparent varnish; it solidifies on being mixed with 20 per cent of its weight of magnesium oxide previously moistened with water; it is completely soluble in ether, chloroform, or benzene.

Habitat: Canada, Maine, Nova Scotia.

Discussion: Abies balsamea is variously known as *Fir Balsam, Balsam Spruce, Hemlock Fir, American Silver Fir* and *Balm of Gilead.* It is a beautiful tree growing to the height of 40 feet and forming an almost perfect cone. The leaves are narrow and flat, bright green on the upper surface and silvery white beneath. The cones which are large, nearly cylindrical in form and of a purplish color, are covered with a resinous exudation which gives them a rich glossy appearance.

Canada balsam is quite liquid and occurs in transversely elongated vesicles, or *blisters,* just beneath the bark. The collecting period lasts for about two months during the heated portion of the summer. It is collected by families known as *balsam gatherers* who camp in the woods during the summer and make a business of collecting the oleoresin. Each individual is provided with a ladder and an iron pot with a short spout resembling a teapot. The spout which is cut off at an angle, forming a sharp edge, is forced into the blister and held in place while the oleoresin flows in. An average sized tree will yield about 250 cc. of oleoresin, and one person can collect about a liter per day. This method of collection does not injure the tree perceptibly, so that after a rest of two or three seasons, the same tree can be worked again. Canada turpentine is sometimes adulterated with common rosin dissolved in oil of turpentine. The importation of Canada turpentine during 1924 amounted to 1322 pounds.

Constituents: Volatile oil 24 per cent, resin 76 per cent.

Properties and Uses: Canada turpentine is irritant, stimulant, and antiseptic. It is used in the manufacture of plasters as a plaster base. The resin left after the distillation of the volatile oil is dissolved in chloroform or xylol and used as a mounting medium in microscopy.

TEREBINTHINA LARICIS

(tĕr-ē-bĭn′thĭ-nȧ lȧr′ĭ-sĭs)

VENICE TURPENTINE—N.F. IV

Synonym: Larch Turpentine.

Source: Larix europœa De Candolle (Fam. Pinaceæ).

Part Used: The oleoresin.

Description and Physical Properties: Venice Turpentine is a nearly transparent, yellowish or yellowish green, thick liquid, heavier than water, and having a distinctive odor and a bitter, characteristic taste.

Completely soluble in alcohol, glacial acetic acid, acetone, or chloroform. Almost entirely soluble in petroleum benzin with the separation of a light flocculent deposit.

Habitat: Central and Southern Europe.

Discussion: This product is collected for the most part in Switzerland and the old French province of Dauphiny (now the Dapartments of Drôme, Hautes-Alpes, and Isère) whence it was formerly shipped through the port of Venice, thus deriving the name *Venice turpentine.* The tree producing it is known as the *Larch* and grows abundantly in the Alps and Jura mountains. The peasants collect the turpentine by boring holes into the trunks of the trees about two feet above the ground, then either conducting the oleoresin, by means of spiles, to small wooden tubs, or by plugging up the holes and allowing them to fill, after which the plugs are removed and the oleoresin scooped out by means of a half-cylindrical iron spoon made for that purpose. The plug is again inserted and the process repeated periodically throughout the productive period of the tree which is usually about thirty years. Each tree will yield from 100 to 200 cc. of oleoresin each year. 4690 pounds of Venice turpentine were imported in 1924.

Constituents: Volatile oil, resin.

Properties and Uses: The action of Venice turpentine is in every way identical with that of Canada turpentine. It is employed in plasters and ointments as a rubefacient and stimulant. It is used internally in catarrhal conditions of the respiratory and genito-urinary tracts.

OIL OF TURPENTINE GROUP

OLEUM TEREBINTHINÆ

(ō′lė-ŭm tĕr-ė-bĭn′thĭ-nē)

OIL OF TURPENTINE—U.S.P.

Synonyms: "Spirit" of Turpentine; Turpentine Oil.

Source: Pinus palustris Miller and other species of Pinus (Fam. Pinaceæ).

Description and Physical Properties: A colorless liquid, having a characteristic odor and taste, both of which become stronger and less pleasant on aging or exposure to air.

Discussion: This oil is obtained from the oleoresin of turpentine by distillation with steam. If distilled without steam, a much higher temperature is required to drive the oil over and the product will have an empyreumatic odor. To further purify the oil it should be redistilled from lime water or a solution of caustic alkali. This product is known as *rectified oil of turpentine* and is the better form for internal administration. When recently rectified by this process, oil of turpentine is a thin, colorless liquid with a characteristic, not unpleasant, odor and taste. On long standing, however, and especially if exposed to light and air, it develops a strong odor and a disagreeable taste, due to the oxidation of the terpenes composing it. This oxidation results in the formation of ozone, resin, formic and acetic acids.

Oil of turpentine consists of a mixture of bodies having the formula $C_{10}H_{16}$, the principal one being pinene. It has a specific gravity of 0.854 to 0.868 at 25° C. When distilled the greater portion should pass over between 154° and 170° C. It is soluble in five volumes of alcohol, and is itself a solvent for resins, waxes, fats, sulphur, phosphorus and caoutchouc. 177,675 gallons of oil of turpentine were imported into the United States in 1924. Terpin hydrate and terebene are prepared from oil of turpentine.

Properties and Uses: Oil of turpentine acts internally as an anthelmintic, expectorant, diuretic, and urinary antiseptic. Thus it is used in numerous conditions, as in chronic bronchial catarrh, gonorrhœa, gleet, cystitis and various chronic urinary troubles. Its anthelmintic properties suggest its use for expelling intestinal worms. It is also used for inflammation of the bowels and traumatic erysipelas. Very old oil is said to be a valuable antidote for phosphorus poisoning. If the dose is too large, it may cause gastro-enteritis, purging and vomiting, and even death. Oil of turpentine is excreted by the bronchi, kidneys and skin.

Externally applied, oil of turpentine is antiseptic, rubefacient and counter-irritant and is used in the form of liniments and stupes in rheumatism, neuralgia, lumbago, sciatica; also in renal colic, pleurisy and bronchitis. Vapors of the oil may be inhaled for bronchitis, laryngitis and whooping-cough.

Terpin hydrate, U.S.P., a crystalline substance made from oil of turpentine, alcohol and nitric acid, is antiseptic, expectorant, diaphoretic, and diuretic. It is used in whooping-cough and chronic bronchitis.

Terebene, U.S.P., a liquid made from oil of turpentine and sulphuric acid, is stimulant, antiseptic, and expectorant and is used in chronic bronchitis. It may be taken by inhalation or administered on sugar.

Official Preparations: U.S.P. X.

Rectified Oil of Turpentine, 5 m. (0.3 cc.).
Cantharides Cerate.

(*a*) JUNIPERUS

(jo͞o-nĭp′ẽr-ŭs)

JUNIPER BERRY—N.F.

(*b*) OLEUM JUNIPERI

(ō′lḗ-ŭm jo͞o-nĭp′ẽr-ī)

OIL OF JUNIPER—U.S.P.

Synonyms: (*a*) Juniper Fruits.
(*b*) Oil of Juniper Berries; Juniper Oil.

Source: Juniperus communis Linné (Fam. Pinaceæ).

Etymology: Juniperus from the Celtic, meaning "thorny" or "rough," referring to the character of the leaves.

Communis the Lat. for *common* or *usual*, i.e., the ordinary kind.

Part Used: (*a*) The carefully dried ripe fruit.
(*b*) The volatile oil distilled from the ripe fruit.

Description and Physical Properties: (*a*) *Unground Juniper Berry:* Nearly globular, about 8 mm. in diameter; externally smooth, shining black brown to purplish black with a blue-gray bloom, at the apex a three-rayed furrow marks the cohesion of the three fleshy bracts forming the outer tissue; internally loosely fleshy, greenish brown, containing numerous large schizogenous cavities; seeds usually three, triangular ovate, hard, brown, with large uneven oil glands on the surface. Odor aromatic; taste sweet, pleasant, terebinthinate, slightly bitter.

(*b*) A colorless or faintly green or yellow liquid, having the characteristic odor and taste of juniper berries.

Habitat: Europe, North America, Northern Africa.

Discussion: All of the oil of juniper used in America is brought from Europe where it is obtained by distilling the ripe juniper berries with salt water or steam. It is colorless, or slightly greenish or yellowish, depending upon the conditions under which it is distilled. It has a characteristic odor and a warm aromatic taste. Many commercial samples have been found to be adulterated with oil of turpentine. 16,C01 pounds of oil of juniper were imported in 1924.

Fig. 4.—Juniper berries.

Constituents: (*a*) Volatile oil; resin, 10 per cent; juniperin.

(*b*) Oil of juniper is composed essentially of two hydrocarbons, one of which boils at 160° C. and has been found to be pinene ($C_{10}H_{16}$). The other distills over at 175° C. and is probably cadinene, a sesquiterpene having the formula $C_{15}H_{24}$. The oil also contains an ester and a small amount of juniper camphor.

Properties and Uses: Oil of juniper is very similar to oil of turpentine in its chemical and therapeutic properties, but is milder in action and more agreeable to take. It is stimulant, diuretic and antiseptic.

Dose: (*a*) Juniper, 60 gr. (4 Gm.).

(*b*) Juniper oil, $1\frac{1}{2}$ m. (0.1 cc.).

Official Preparations: N.F. V.

(*a*) Compound Elixir of Buchu, 1 fl. dr. (4 cc.).
Elixir of Buchu, Juniper and Potassium Acetate, 1 fl. dr. (4 cc.).
Compound Fluidextract of Buchu, 30 m. (2 cc.).
Fluidextract of Juniper Berry, 1 fl. dr. (4 cc.).

OLEUM SABINÆ

(ō′lē̆-ŭm sā-bī′nē)

OIL OF SAVIN—U.S.P. VIII

Source: Juniperus Sabina Linné (Fam. Coniferæ).

Etymology: Sabina from the name of a tribe of people inhabiting Italy. Juniperus from the Celtic, meaning *thorny* or *rough* and referring to the character of the leaves.

Description and Physical Properties: A colorless or yellowish liquid, having a peculiar terebinthinate odor, and a pungent, bitter, and camphoraceous taste.

Habitat: Europe, Northern Asia, North America.

Discussion: Oil of savin is a colorless or yellowish liquid with a peculiar terebinthinate odor and a bitter pungent taste. It is collected by subjecting the tops of the branches (the fresh growing ends of the twigs) to steam distillation. This carries the oil over with the water vapor which separate on cooling. The oil is dextrogyrate, the angle of rotation being 40° to 60° in a 100 mm. tube at 25° C. Its specific gravity varies from 0.903 to 0.923 at 25° C.

Constituents: Pinene ($C_{10}H_{16}$), cadinene ($C_{15}H_{24}$), sabinol ($C_{10}H_{16}O$).

Properties and Uses: Oil of savin is stimulant and is reputed to possess emmenagogue properties. It has been used for producing criminal abortion and numerous deaths have been reported from this cause.

Dose: 1 m. (0.05 cc.).

OLEUM PINI PUMILIONIS

(ō′lĕ-ŭm pī′nī pŭ-mĭl′ĭ-ōn′ĭs)

OIL OF DWARF PINE NEEDLES—U.S.P.

Synonyms: Pine-Needle Oil; Dwarf Pine Oil; Oil of Dwarf Pine Needles.

Source: Pinus montana Miller (Pinus Pumilio Hænke) (Fam. Pinaceæ).

Etymology: Pini, genitive of the Lat. "pinus," *a pine tree.*

Pumilio from the Lat. "pumilus," *dwarfish,* referring to its small size.

Montana from the Lat. "montanus," *mountainous,* i.e., growing in mountainous regions.

Part Used: The volatile oil distilled from the fresh leaves.

Description and Physical Properties: A colorless or faintly yellowish liquid, having a pleasant, aromatic odor, and a bitter, pungent taste.

Habitat: Central Europe in the Tyrolese Alps and Carpathian mountains.

Discussion: Pinus pumilio is a small tree with decumbent or knee-like branches. It grows in the above-named districts at an elevation of 4000 to 8000 feet. The leaves are from 1 to 2 inches in length, occur two in a sheath, and are of a dull-green color.

The oil is distilled from the fresh leaves and is a colorless or slightly yellowish liquid with a pleasant aromatic odor and a pungent taste. Its specific gravity varies from 0.853 to 0.869 at 25° C. Its optical rotation varies from − 4° 30′ to −9° in a 100-mm. tube at 25° C.

Constituents: Lævo-pinene, lævo-phellandrene, bornyl acetate, sylvestrene. The U.S.P. X. requires not less than 5 per cent of esters calculated as bornyl acetate ($C_{10}H_{17}.C_2H_3O_2$).

Properties and Uses: Oil of dwarf pine needles is used as an inhalation in laryngitis and chronic bronchitis, also applied externally in the form of a liniment to rheumatic joints, etc.

COLOPHONIUM GROUP

RESINA

(rĕz-ī′nȧ)

ROSIN—U.S.P.

Synonyms: Resin; Colophony; Yellow Rosin.

Source: Pinus palustris Miller, and other species of Pinus (Fam. Pinaceæ).

Etymology: Pinus from the Lat. "pinus," *a pine tree.*

Palustris, the genitive form of the Lat. "paluster," from "palus," *a swamp,* i.e., growing in marshy or swampy places.

Rosin from the Lat. "resina," from the Gr. "retine," the name for the pine rosin.

Colophony from the Gr. "Kolophon," *a city of Ionia* (Greece) after which the resin was named.

Habitat: United States and Europe.

Description and Physical Properties: Sharply angular, translucent, amber-colored fragments, frequently covered with a yellow dust, fracture brittle at ordinary temperatures, shiny and shallow-conchoidal. The odor and taste are slightly terebinthinate.

Rosin is freely soluble in alcohol, ether, benzene, glacial acetic acid, and in fixed or volatile oils. It is also soluble in dilute solutions of the fixed alkali hydroxides.

Discussion: Rosin is the residue left after the distillation of the volatile oil from American turpentine. Its color and properties depend largely upon its source and the condition of the oleoresin from which it is obtained as well as the care used in the distillation. The cleaner and lighter colored the oleoresin, the lighter in color the rosin will be. The temperature at which the distillation is conducted also affects the color of the rosin, higher temperatures tending to darken it. The importation of rosin for 1924 amounted to 652,997 pounds.

Constituents: Rosin consists of from 80 to 90 per cent of the anhydride of abietic acid. Pinic and sylvic acids are also present in small amount. In its purest state it is very clear and translucent, but the samples seen in commerce usually vary in color from a pale-yellow to almost black. The clear, translucent rosin is amorphous, while the opaque form is more or less crystalline. The so-called white rosin differs from the preceding only in being opaque and of a whitish color due to the incorporation of water while it is in a state of fusion.

Properties and Uses: Rosin is mildly antiseptic and stimulant, and is used to promote the formation of healthy granular tissue. Because it will fuse and mix with other waxy and fatty substances it is a valuable ingredient of ointments, cerates and plasters. Commercially it is used in the manufacture of laundry soaps and varnishes and as a sizing for paper. When subjected to dry distillation, rosin yields the following products: (1) *light rosin oil*—used in the manufacture of varnish, (2) *heavy rosin oil*—used in the manufacture of printer's ink and (3) *common pitch*—used in the manufacture of ship chandler's pitch.

Official Preparations: U.S.P. X.
Rosin Cerate.
Cantharides Cerate.

RESINA PINI GROUP

PIX BURGUNDICA

(pĭx bûr-gŭn′dĭ-cȧ)

BURGUNDY PITCH—U.S.P. VII

Source: Abies excelsa Poiret (Fam. Coniferæ).
Part Used: The resinous exudation from the tree.
Habitat: Europe, Northern Africa.

Discussion: The tree furnishing Burgundy pitch is the Norway spruce. It is a very large tree, growing sometimes to the height of 150 feet and from 3 to 5 feet in diameter. The short four-cornered, dark-green leaves stand thickly upon the branches.

In collecting this product, portions of the bark are removed so as to expose the wood, whereupon the resinous exudation flows out and concretes upon the surface. After collecting, it is melted in hot water and strained through coarse cloth to remove fragments of bark and wood. At the present time the Burgundy pitch of the market is collected in Finland and the Black Forest of Austria, though the old province of Burgundy in east-central France is supposed to have been the original source. It is claimed by various authors that a considerable portion of the Burgundy pitch of to-day comes from the Abies Picea or the European silver fir.

A similar product is collected from various species of pine throughout Europe and sold under the same name. A fictitious article is also prepared from common pitch, rosin and oleoresin of turpentine. They are melted together and agitated with water which gives to the mixture a yellowish color similar to that of the genuine Burgundy pitch. The importation of this article in 1924 amounted to 233,445 pounds.

Constituents: Resin, volatile oil.

Properties and Uses: Burgundy pitch is stimulant, antiseptic and counter-irritant, and like rosin, it is used as a plaster base and as an ingredient of ointments.

PIX CANADENSIS

(pĭx kăn′ȧ-dĕn-sĭs)

CANADA PITCH—U.S.P. VII

Synonyms: Hemlock Pitch; Hemlock Gum.

Source: Abies Canadensis Michaux (Pinus Canadensis Linné), (Tsuga Canadensis Carr) (Fam. Coniferæ).

Part Used: The resinous exudation.

Description and Physical Properties: Hard, yet gradually taking the form of the vessel in which it is kept; brittle, with a shining, conchoidal fracture; opaque or translucent, dark reddish brown, having a weak, somewhat terebinthinate odor.

Habitat: Northern United States, Canada.

Discussion: This tree is well known in the northern part of the United States and Canada as the *Hemlock* or *Hemlock Spruce*. It grows abundantly in Canada, Nova Scotia, the northern parts of New England and in the mountainous regions of the middle states. It grows to the height of 80 feet with a trunk 2 or 3 feet in diameter.

Collection of the oleoresin is not made until the tree has attained its full growth and begun to decay since the growing tree contains much less oleoresin than other members of the coniferæ and the amount that will flow from incisions made in the trunk is very slight. However, in trees that have begun to decay, a considerable amount of oleoresin is formed by a process of metamorphosis of the cell walls. This exudes spontaneously and concretes upon the bark which is then removed and boiled in water whereupon the oleoresin melts and rises to the surface. It is skimmed off and further purified by a second boiling and straining. The product is now hard and brittle and of a dark-reddish-brown color. It softens and becomes adhesive when warmed, and even when cold will gradually assume the shape of the vessel containing it.

Constituents: Canada pitch is composed almost entirely of resin, with a trace of volatile oil.

Properties and Uses: Canada pitch is very similar in its properties to Burgundy pitch and is employed in the same variety of conditions. It is, however, more readily softened by heat and is sometimes too soft for convenient application to the body, necessitating the addition of some firmer ingredient to produce the desired consistency.

A volatile oil known as *Oil of Spruce* or *Oil of Hemlock*, is distilled from the leaves of Abies Canadensis. It is quite similar in its properties to oil of savin and, like it, has been employed to produce criminal abortion.

Hemlock bark is largely employed in the tanning industry and, like oak and quebracho barks, produces a very good quality of leather.

TAR GROUP

PIX PINI

(pĭx pī′nī)

PINE TAR—U.S.P.

Synonym: Pix Liquida, U.S.P. IX.

Source: Various species of Pinus, especially Pinus palustris Miller (Fam. Pinaceæ).

Part Used: A product obtained by the destructive distillation of the wood.

Description and Physical Properties: A very viscid, blackish-brown, non-crystalline liquid. It is translucent in thin layers, becoming granular and opaque with age. It has an empyreumatic, terebinthinate odor and a sharp, empyreumatic taste.

Pine Tar is heavier than water and is slightly soluble in it, the solution being pale yellowish to yellowish-brown and acid to litmus paper.

Pine Tar is miscible with alcohol, ether, chloroform, glacial acetic acid, and fixed and volatile oils.

Habitat: Southeastern United States (Virginia to Florida).

Discussion: The dead timber caused by the destruction of the trees in the turpentine industry, or through natural causes, is employed for the production of pine tar. The logs are cut into blocks, or *billets*, of convenient length, and these arranged in compact piles of considerable size. These piles are then covered with earth as in the process of making charcoal. This pile is called a *stack*, and is built upon a mound of earth so formed as to slope from the outer edges to the center where a hole of convenient size is made. This hole in the center of the depression communicates with another on the outside of the mound by means of a covered ditch. The stack of wood is then ignited at the top where a small opening is left, just sufficient to admit enough air to maintain a slow, incomplete combustion. As the wood is charred the resinous matter and the empyreumatic products formed flow downward into the hole in the center of the depression, thence through the covered ditch to the outer excavation from which the product is dipped into barrels. Large quantities of pine tar are thus prepared in North Carolina and Virginia. A large quantity of charcoal is formed in this process and constitutes a valuable by-product.

CONSTITUENTS: Resin, empyreumatic oils, cresols, phenols, acetic acid, small amounts of formic, propionic and capronic acids, acetone, methyl alcohol, toluol, xylol, cumol, naphthalene, pyrene, chrysene.

PROPERTIES AND USES: Pine tar is a stimulating expectorant and is used internally in coughs, colds, bronchitis, and catarrh. Externally it is antiseptic, counter-irritant and insecticide. Thus it is employed in scaly eruptions of the skin, eczema, scabies and gangrene.

DOSE: 8 gr. (0.5 Gm.).

OFFICIAL PREPARATION: U.S.P. X.
Tar Ointment.

OLEUM CADINUM

(ō-lē̆-ŭm kă-dī′nŭm)

OIL OF CADE—U.S.P.

SYNONYMS: Juniper Tar Oil; Cade Oil.

SOURCE: Juniperus Oxycedrus Linné (Fam. Pinaceæ).

PART USED: A product of the destructive distillation of the wood.

DESCRIPTION AND PHYSICAL PROPERTIES: A dark-brown, clear, thick liquid, having a tarry odor, and a warm, faintly aromatic, bitter taste.

The Oil is very slightly soluble in water, but imparts to it an acid reaction shown by moistened blue litmus paper. It is only partially soluble in alcohol and in petroleum benzin, but completely soluble in 3 volumes of ether and soluble in all proportions in amyl alcohol, chloroform, glacial acetic acid, and in oil of turpentine.

HABITAT: Spain, Portugal, France.

DISCUSSION: Juniperus Oxycedrus is commonly known as the *Prickly Cedar* or *Large Brown-fruited Juniper*. It grows in waste places and on stony hillsides of the countries mentioned above. It ordinarily attains the height of 10 or 12 feet and has long spreading branches with many large globular, reddish or chestnut-brown fruits. The heartwood is the source of the medicinal product which is made by destructive distillation, similar to the process used in making pine tar. Juniper tar oil is a dark-brown liquid, similar to pine tar, but is usually not quite so thick. It has a distinctive odor and an acrid, disagreeable taste.

Constituents: Volatile oil, resin, several phenols, cadinene (a sesquiterpene having the formula $C_{15}H_{24}$). Pyroligneous acid, acetone and methyl alcohol are also present.

Properties and Uses: Oil of cade is an antiparasitic and is used in various skin affections such as chronic eczema and psoriasis. It may be diluted with any bland oil or applied as an ointment or glycerite. It is rarely used internally, but possesses considerable anthelmintic value when so used. The dose should not exceed from 2 to 5 minims (0.125 cc. to 0.3 cc.).

PITCH GROUP

PIX NIGRA

(pĭx nī′grȧ)

BLACK PITCH

Synonyms: Resina Nigra; Common Pitch; Pix.

Source: This is the residue left after subjecting pine tar to simple distillation for the recovery of the more volatile portions.

Properties and Uses: Black pitch softens and becomes adhesive when moderately heated, but when cold breaks with a shiny fracture. Pitch was formerly employed both internally and externally as a remedy for certain skin diseases such as ichthyosis, but its present use is confined almost entirely to manufacture and ship building. It is used in the manufacture of shoemakers' and ship chandlers' wax. Pitch consists principally of unaltered resin, together with various empyreumatic resinous products. It is almost identical with the product obtained by subjecting common rosin to dry distillation.

PINUS ALBA

(pī′nŭs ăl′bȧ)

WHITE PINE BARK—N.F.

Synonyms: Weymouth Pine; Northern Pine.

Source: Pinus Strobus Linné (Fam. Pinaceæ).

Etymology: Pinus, the Lat. for "*pine tree.*"

Alba from the Lat. "albus," *white*, i.e., the white pine.

Strobus from the Gr. "strobilos," *a pine cone*, from "strobos," *a whirling*, referring to the top-like form of the cone.

Part Used: The dried, inner bark.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground White Pine Bark:* In flat pieces of variable size and from 1 to 3 mm. in thickness; outer surface varying from a pale, pinkish-white when fresh, to a light or rather deep-yellowish brown on keeping, occasionally with small patches of the gray-brown periderm adhering; more or less cottony, and often showing small scattered pits; inner surface either lighter or darker than the outer, finely striate; fracture short, irregular, transverse section showing an outer yellowish and an inner whitish band. Odor slight, terebinthinate; taste slightly mucilaginous, bitter, sweet and astringent.

HABITAT: Northern United States, Canada.

DISCUSSION: This is the famous white pine, formerly very abundant in the region of the Great Lakes. The inner bark occurs in the market in the form of flat chips or shreds. These are either a pale-yellowish-brown or a light-pink in color and have a slight terebinthinate odor and a sweetish, astringent taste.

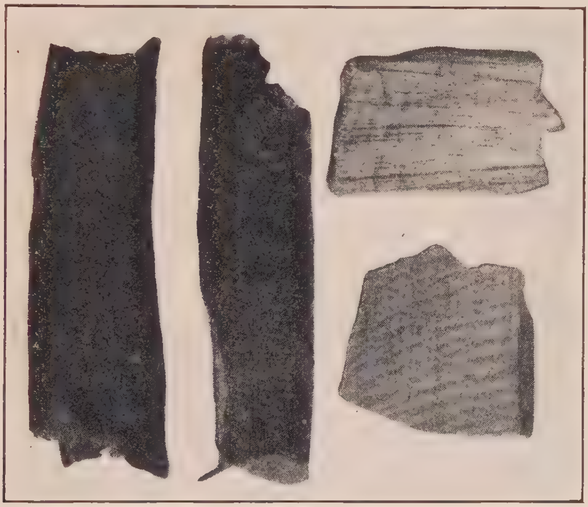

FIG. 5.—White Pine Bark.

CONSTITUENTS: Coniferin ($C_{16}H_{22}O_8 . 2H_2O$); resin; tannin.

PROPERTIES AND USES: White pine bark is astringent and feebly expectorant. Generally used in the form of a syrup.

DOSE: 30 gr. (2 Gm.)

OFFICIAL PREPARATIONS: N.F. V.

Compound Syrup of White Pine, 1 fl. dr. (4 cc.).

Compound Syrup of White Pine with Morphine, 30 m. (2 cc.).

THUJA

(thū′jȧ)

THUJA—N.F.

Synonyms: Arbor Vitæ; White Cedar; Feather-leaf Cedar.
Source: Thuja occidentalis Linné (Fam. Pinaceæ).
Etymology: Thuja from the Gr. "thuia," *an African tree* with sweet-smelling wood.

Occidentalis, the Lat. for "*western*," from "occidere," *to fall* or *go down*, i.e., the place where the sun goes down.

Arbor Vitæ from the Lat. "arbor," *tree*, and "vitæ," *of life*, from "vivere," *to live*.

Part Used: The dried, leafy young twigs.

Description and Physical Properties: *Unground Thuja:* Twigs fan-shaped, flattened, bearing the scale-like, imbricated leaves appressed in four rows; leaves of the edges boat-shaped, the intermediate flat, those at the tips of the twigs very broad, the lower elongated, all bearing conspicuous glands on the back. Odor strongly balsamic, aromatic and pungent; taste camphoraceous, terebinthinate and bitter.

Habitat: Northeastern North America.

Discussion: This is a beautiful evergreen tree growing from 30 to 60 feet in height. The branchlets spread out in a fan-like manner giving it a distinctive appearance. The twigs, each bearing four rows of closely appressed scale-like leaves, are also flattened. It is much used as an ornamental tree.

Constituents: Volatile oil, 1 per cent; resin; tannin.

Properties and Uses: The volatile oil is emmenagogue. It is also used in bronchial catarrh and rheumatism. Externally it may be applied in the form of an ointment for ulcers, sores, etc.

Dose: 30 gr. (2 Gm.).

Official Preparation: N.F. V.

Fluidextract of Thuja, 30 m. (2 cc.).

OLEUM PICIS RECTIFICATUM

(ō′lē̇-ŭm pī′cĭs rĕk-tĭ-fĭ-kā′tŭm)

RECTIFIED OIL OF TAR—U.S.P.

Synonym: Rectified Tar Oil.
Source: Pine Tar, "pix pini," U.S.P.
Etymology: Oleum, the Lat. for "*oil*."

Picis, the genitive of "pix," the Lat. for "*tar.*"

Rectificatum from the Lat. "rectificare," *to make right,* from "rectus," *straight,* i.e., purified.

PART USED: The volatile oil from pine tar rectified by steam distillation.

DESCRIPTION AND PHYSICAL PROPERTIES: A thin liquid, having a dark-reddish-brown color, and a strong, empyreumatic odor and taste.

HABITAT: Southeastern United States.

DISCUSSION: Rectified oil of tar has a specific gravity varying from 0.960 to 0.990 at 25° C. It is distilled from pine tar, the residue left being common black pitch. Only that portion which is lighter than water is used. It is purified by redistillation.

CONSTITUENTS: Rectified oil of tar contains cresols, phenols, volatile oil, resin and a large number of undetermined empyreumatic products.

PROPERTIES AND USES: On account of its expectorant action, rectified oil of tar is employed in bronchitis. Externally it is employed in a number of skin diseases, as eczema, scabies, ulcers, sores and gangrene.

DOSE: 3 m. (0.2 cc.).

OFFICIAL PREPARATION: U.S.P. X.

Syrup of Pine Tar, 2½ fl. dr. (10 cc.).

ANGIOSPERMS

The name angiosperm (from the Gr. "aggeion," *a vessel,* or *receptacle,* the diminutive of "aggos," *a chest,* or *jar,* and "sperma," *a seed,* was given this group of plants because the seed is enclosed in an ovary). They constitute the most highly organized members of the plant kingdom. Their flowers are nectar-bearing and often very showy, comprising the greatest diversity of forms.

In the gymnosperms the flowers are either *monœcious,* i.e., both staminate and pistillate flowers grow on the same plant, or *diœcious,* i.e., the above-named organs appear on different plants. This is also the case with many of the angiosperms, but most of them are *hermaphroditic,* i.e., contain both stamen and pistil within the same flower. The seeds of the gymnosperms may have two, four, six, or even as many as fifteen cotyledons, whereas the seeds of the angiosperms have either one or two cotyledons, which fact constitutes the basis for the division into their respective classes as follows:

$$\text{Angiosperms}\begin{cases}\text{Monocotyledons}\\ \text{Dicotyledons}\end{cases}$$

MONOCOTYLEDONS

The most distinctive characteristic of this group of plants is found in the seed which contains but one cotyledon. Therefore but one embryonic leaf occurs at the first node as, for example, in the case of corn and the various grains and grasses. The leaves of the monocotyledons are usually long and narrow, with parallel veins and entire margins. The stem possesses no cambium zone by which growth in thickness may take place, and it is seldom that a distinction between wood and bark may be made. The monocotyledons include a large number of families yielding medicinal plants. A consideration of these various families, together with their medicinal representatives, will now be taken up.

CHAPTER VI

LILIACEÆ

(lĭl′ĭ-ā′sē̇-ē)

LILY FAMILY

The plants of this family are mostly perennial herbs with bulbs or tubers, and rarely fibrous roots. They number about 2500 species and are found in nearly all parts of the world. They have parallel-veined, sessile leaves and symmetrical, usually beautifully colored flowers. The fruits are trilocular, dehiscent capsules. Their chief use is as ornamental plants, although a few are used in medicine and some as food products.

ALOE

(ăl′ō)

ALOE—U.S.P.

Synonyms: Curaçao Aloe; Socotrine Aloe; Cape Aloe; Aloes.

Source: Aloe Perryi Baker, yielding Socotrine aloe; Aloe vera Linné, yielding Curaçao aloe; Aloe ferox Miller, yielding Cape aloe (Fam. Liliaceæ).

Etymology: Aloe from the Arabic "alloeh," or the Hebrew "halal," signifying *a shining, bitter substance.*

Perryi given in honor of Wykeham Perry who made extensive studies of the plant in its native habitat.

Vera from the Lat. "verus," *true,* i.e., the original or primitive type.

Ferox from the Lat. "ferox," or "ferus," *fierce, coarse, wild,* i.e., a large plant with prickly leaves.

Part Used: The inspissated juice of the leaves.

Description and Physical Properties: *Unground Socotrine Aloe:* In yellowish-brown to blackish brown, opaque, smooth and glistening masses; fractured surface somewhat conchoidal; odor characteristic.

Unground Curaçao Aloe: In orange to blackish brown, opaque masses; fractured surface uneven, waxy, somewhat resinous; odor characteristic, disagreeable.

Unground Cape Aloe: In reddish-brown masses, usually covered with a yellowish powder, or in thin, transparent fragments, of a reddish-brown color; fracture smooth and glassy; odor characteristic, sour and disagreeable.

The taste of each variety of Aloe is nauseous and very bitter.

HABITAT: Socotrine aloe, from the island of Sokotra; Curaçao aloe, from Curaçao and other islands of the West Indies; Cape aloe, from Cape Colony.

DISCUSSION: There are numerous species of the genus Aloe inhabiting various parts of the earth. They all resemble, more or less, the American Agave, or *Century Plant.* All of these species contain a juice which yields aloe upon evaporation.

Socotrine aloe is obtained from the Aloe Perryi, which grows abundantly on the island of Sokotra, especially in the limestone districts from sea level to an altitude of 3000 feet. In this species the stem is erect and woody, some 18 inches or more in height and several inches in diameter. The stem is leafless below, but contains a whorl of green sword-shaped leaves at the top. These leaves are somewhat concave on their upper surface, convex below and curved inward at the point.

Aloe vera, which yields the Curaçao variety, was a native of southeastern Europe, northern Africa and Madagascar Island, but was introduced into the West Indies at an early date. In this species the stem is very short and woody, with leaves nearly flat on the upper surface, convex beneath and armed with hard woody spines along the margin. It is cultivated in Italy, Sicily and the Island of Malta.

The method of recovering the drug varies somewhat in different localities, but in Curaçao and other islands of the West Indian archipelago it is done as follows: The leaves are cut from the plant and stood upright in a V-shaped trough so placed that the juice, as it exudes, will flow into a cask. The juice is then dried in the sun or boiled in copper pans until it reaches the desired consistency when it is poured, while liquid, into gourds or wooden boxes, the latter holding 112 pounds, and allowed to harden.

Socotrine aloe was the first variety employed medicinally. Its use dates back several centuries before the Christian Era. We find that Alexander the Great as early as 333 B.C. sent a commission to the island of Sokotra to investigate the production of this drug. At one time the production of aloe in Arabia was controlled by government monopoly, but this has been changed, and for a long time now the people have been free to cultivate the plant at will. In Arabia the method of collecting the juice and preparing the aloes therefrom is as follows: The juice from the cut leaves is allowed to flow into goat skins which are placed in holes in the ground with the smooth side up. It is left in this improvised receptacle for several weeks, or even months, to dry spontaneously, after which it is poured into vessels for the market. During this long period of exposure, much foreign matter is blown in by the wind.

The method of collecting Cape aloe is to so place the leaves that the juice will flow into goat or sheep skins, as in the case of the Socotrine variety; then evaporating it in metallic vessels by the aid of artificial heat until it has reached the desired consistency, when it is poured into monkey skins and allowed to cool and harden.

Curaçao aloe is a commercial variety of considerable importance produced, for the most part, in the Dutch West Indies, chiefly in the islands of Curaçao, Barbadoes and Oruba. It is allowed to evaporate spontaneously until it has reached the desired consistency when it is poured into gourds, calabashes or wooden boxes to harden. It is sent to market in these forms.

The juice from which aloe is made was formerly thought to exist in longitudinal vessels just beneath the epidermis of the leaves. The reason for this belief doubtless originated from the ease with which it flowed from the transversely cut leaves. Investigation, however, has shown these vessels to be air ducts, the juice coming from the parenchymatous tissue, the cell walls of which are very thin and, owing to the pressure within, give way after the leaves are cut because of the unequal pressure. The leaves of all species of Aloe are very thick and succulent, storing up water under considerable pressure. They are also provided with an epidermis which is well suited to resist evaporation. They are therefore adapted to the hot, dry climate and sandy soil of the tropics. For this reason they are classed with the xerophytes (from the Gr. "xeros," *dry*, from "xerasia," *dryness*, from "xerainein," *to dry*), or drouth loving plants. The importation of aloe during the year 1924 amounted to 1,164,982 pounds.

Constituents: Aloin, 20 per cent, obtained commercially from Curaçao aloe only as other species contain less of it and it is much more difficult to separate from them in pure form. Other constituents are emodin, 0.15 to 2 per cent, resinous matter, 30 to 50 per cent, moisture, 5 to 10 per cent.

Properties and Uses: The cathartic action of aloe is exerted principally on the colon, although it stimulates the intestinal secretions generally. Thus it is employed in that variety of cases where constipation is due to an atonic condition of the muscular layer of the large intestine. It is serviceable in jaundice and atonic dyspepsia. Through a reflex action, emanating from the irritation of the lower bowel, the uterus is stimulated, thus rendering aloe serviceable in amenorrhœa to initiate the normal functional activity. Aloe is disagreeable to certain types of entozoa, especially the round worm (Ascaris lumbricoides) and may be used in the form of enema for their expulsion.

DOSE: 4 gr. (0.25 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Compound Extract of Colocynth, 4 gr. (0.25 Gm.).
Pills of Aloe, 2 pills.
Compound Tincture of Benzoin, 30 m. (2 cc.).

SCILLA

(sĭl′ȧ)

SQUILL—U.S.P.

SYNONYMS: White Squill; Sea Onion.

SOURCE: Urginea maritima (Linné) Baker (Fam. Liliaceæ).

ETYMOLOGY: Scilla and squill from the Gr. "skilla," *an onion,* from "skizein," *to split,* referring to the scales of the bulb which separate like those of the onion.

Urginea from the Lat. "urgere," *to press,* referring to the flattened compressed seeds.

Maritima from the Lat. "maritimus," *relating to the sea,* i.e., grows in seacoast regions.

PART USED: The cut and dried fleshy inner bulb scale of the white variety.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Squill:* Irregular, curved or flattened pieces, from 0.5 to 5 cm. in length; yellowish white, somewhat translucent; brittle when dry, and tough and flexible when damp; odor slight; taste bitter, mucilaginous and acrid.

HABITAT: The Mediterranean basin near the sea, i.e., Portugal, Spain, France, Italy and Greece.

DISCUSSION: Squill is a perennial bulbous plant, sending up each year several long lanceolate, pointed, deep-green leaves, from the midst of which a smooth, round, succulent flower stem rises. This stem is from 1 to 3 feet in height and terminates in a long close spike of nearly white flowers.

The bulb is pear-shaped and varies in size from 2 to 6 or more inches in diameter. It consists of fleshy scales over-lapping each other and covered with a thin, dry, membranous coat. There are two varieties, one known as the *red squill* and the other as the *white squill.* In the former the exterior coat is of a deep-reddish-brown color. The inner scales have a pinkish epidermis. In the white squill the entire bulb is whitish or nearly colorless. Only the white variety is recognized by the United States Pharmacopœia.

The bulb is filled with a viscid, acrid juice which will inflame or even excoriate the skin if left in contact with it very long. About 80 per cent of the weight of the bulb is lost during the process of drying, the acrimony being very much diminished, but with very little loss of medicinal power.

The bulb is cut into thin, transverse slices and dried in the sun or by artificial heat. The outer scales are rejected since they are so dry as to be of little value. Under the microscope, squill is found to be composed of thin-walled cells in which many large crystal pockets, containing beautiful raphides of calcium oxalate, are located. These crystals may be found even in the finest powder. It is thought that they serve to protect the plant against the attack of snails and other animals.

Constituents: Scillin, a pale-yellowish, crystalline substance, soluble in alcohol. Scillitoxin, a brown, bitter glucoside, amorphous, insoluble in water and ether, but soluble in alcohol. Scillipicrin, a bitter, yellowish-white, amorphous substance, hygroscopic, soluble in water.

Properties and Uses: Squill is expectorant (in large doses emetic) and is employed in various conditions of the respiratory tract such as bronchitis, asthma, irritant coughs and whooping-cough. In such cases it is often combined with other expectorants as ipecac, ammonium carbonate and chloride, lobelia, senega and tartar emetic. It is administered in spasmodic croup in repeated doses until nausea and vomiting occur. Squill is mildly diuretic. It frequently is combined with digitalis, strophanthus or saline diuretics. Its heart action is similar to that of digitalis.

Dose: 1½ gr. (0.1 Gm.).

Official Preparations: U.S.P. X.

Vinegar of Squill, 15 m. (1 cc.).
Fluidextract of Squill, 1½ m. (0.1 cc.).
Syrup of Squill, 30 m. (2 cc.).
Compound Syrup of Squill, 30 m. (2 cc.).
Tincture of Squill, 15 m. (1 cc.).

(*a*) COLCHICI CORMUS

(kŏl′kĕ-kī kŏr′mŭs)

COLCHICUM CORM—U.S.P.

(*b*) COLCHICI SEMEN

(kŏl′kĕ-kī sē′mĕn)

COLCHICUM SEED—U.S.P.

Synonyms: Wild Saffron; Meadow Saffron; Autumn Crocus; Meadow Crocus.

Source: Colchicum autumnale Linné (Fam. Liliaceæ).

Etymology: Colchicum from the Gr. "kolchikon," *a poisonous plant*, from "Kolchis," *an ancient province in Asia Minor*, east of the Black Sea, where the plant flourished.

Autumnale, the Lat. for *autumn*, referring to the season of the year when the plant blooms.

Part Used: (*a*) the dried corm which must yield not less than 0.35 per cent of colchicine.

(*b*) The dried ripe seed which must yield not less than 0.45 per cent of the same constituent.

Description and Physical Properties: (*a*) *Unground Colchicum Corm:* Usually in reniform transverse slices or in ovate longitudinal slices from 2 to 5 mm. in thickness; flat surfaces whitish, slightly roughened, and of a crystalline appearance under a hand lens; epidermal surface light brown and finely wrinkled; fracture short and mealy; odor slight; taste bitter and acrid.

(*b*) *Unground Colchicum Seed:* Ovoid or irregularly globular, minutely pointed at the hilum, and with a distinct beak or caruncle approximately opposite to the hilum; from 2 to 3 mm. in diameter and, when fresh, with a tendency to cohere in small clumps; externally dark brown, finely pitted; tough and of bony hardness; internally whitish or light brown; nearly inodorous; taste bitter and acrid.

Habitat: Central and Southern Europe, Northern Africa, Asia Minor.

Discussion: This is a perennial, bulbous plant the flowers of which appear in autumn and the leaves the following spring. Late in the summer a new bulb, or corm, begins to form as an offshoot of the old one. This new corm sends out fibrous roots from its base and a cylindrical tubular spathe from the upper portion. In autumn, from two to six flowers of a pale-purple, or lilac color, unaccompanied by leaves, emerge from the spathe. These die down as winter approaches, but the embryonic fruits remain under ground until the following spring, when they rise upon a new stem above the ground in the form of three-celled capsules, accompanied by numerous, radical, spear-shaped leaves about 5 inches in length and 1 inch in breadth at the base. In the meantime the new corm has been growing at the expense of the old one which, having thus fulfilled its mission, now dies, leaving the new corm to repeat the process.

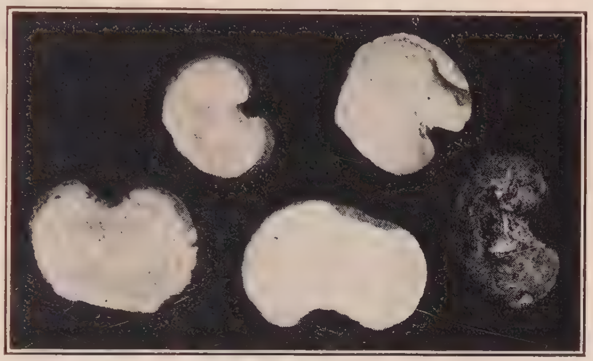

Fig. 6.—Colchicum corm.

The medicinal value of the corm depends upon the season at which it is collected. For example, early in the spring it is comparatively weak in alkaloids. Again in the fall, it becomes exhausted by the nourishment afforded the new plant. The proper time, therefore, for its collection is from the early part of June, when it is fully developed, to the middle of August when the new corm appears. The corm should be thinly sliced and carefully dried so as not to injure it by too much heat. The amount of colchicum (including corm and seed) imported in 1924 was 14,709 pounds.

Constituents: The official alkaloid, colchicine, is the only constituent of importance. It contains colchiceine also.

Properties and Uses: Colchicum is alterative and is used in gout and rheumatism. It is regarded as almost specific in the acute form of gout especially when so used as to produce griping and bowel movement.

Dose: (*a*) Colchicum corm, 4 gr. (0.25 Gm.).
(*b*) Colchicum seed, 3 gr. (0.2 Gm.).

Official Preparations: U.S.P. X.
(*a*) Extract of Colchicum (corm), 1 gr. (0.06 Gm.).
(*b*) Fluidextract of Colchicum (seed), 3 m. (0.2 cc.).
Tincture of Colchicum (seed), 30 m. (2 cc.).

VERATRUM VIRIDE

(vē̇-rā′trŭm vĭr′ĭ-dē)

VERATRUM VIRIDE—U.S.P.

Synonyms: Green Hellebore; American Hellebore; Indian Poke; Itchweed; Tickleweed; Bugbane; Swamp Veratrum; False Veratrum.

Source: Veratrum viride Aiton (Fam. Liliaceæ).

Etymology: Veratrum from the Lat. "vere," *truly*, and "ater," *dark* or *black*, i.e., the roots of some of the species are dark in color. Viride from the Lat. "viridis," *green*, referring to the color of the flowers.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Veratrum Viride:* Rhizome more or less conical, from 2 to 7 cm. in length, from 1.5 to 3 cm. in diameter, externally light to dark-brown or brownish-black; frequently bearing at the summit numerous, thin, closely-arranged leaf bases, otherwise rough and wrinkled and somewhat annulate from scars of bud scales; inodorous; taste bitter and acrid. Roots numerous, nearly cylindrical, from 3 to 8 cm. in length and from 1 to 4 mm. in diameter, usually brittle, whitish, and more or less starchy.

Habitat: Europe, Northern Asia, North America, in rich, moist woodlands and swampy lands.

Discussion: The American hellebore has a thick, fleshy rhizome, which is perennial, and a solid, round, annual stem from 3 to 6 feet in height and terminating in a panicle of greenish-yellow flowers. The leaves near the base of the stem are large, but gradually become smaller nearer the top. The fruit is a three-celled capsule containing many flat seeds. It grows in swamps, low meadow-lands and along the banks of mountain streams. It is more abundant in the northern states, but is found as far south as Georgia.

Veratrum album is a native of Europe and Northern Asia. It is distinguished from the American species by its yellowish-white flowers. The drug is collected in autumn or just before flowering and is said to lose its activity after about one year. 83,377 pounds of veratrum were imported in 1924.

Constituents: Protoveratrine, most important of the several alkaloids of this drug, jervine, pseudojervine, rubijervine, veratrine (cevadine), veratroidine in very small amount, protoveratridine, may be a decomposition product of protoveratrine.

Properties and Uses: Veratrum resembles aconite in its action on the heart, diminishing the force and frequency of the cardiac contraction. This seems to be brought about in part by direct depression of the cardiac muscle and in part by stimulation of the inhibitory apparatus. If the dose administered be very large, it will produce paralysis due to depression of the spinal cord. It is used to reduce artificial tension and spasmodic conditions; also in pneumonia and typhoid fever to regulate the heart's action. It is used to control puerperal and epileptiform convulsions, tetanus, chorea and nervous palpitation. It is used in mania-a-potu and diphtheria.

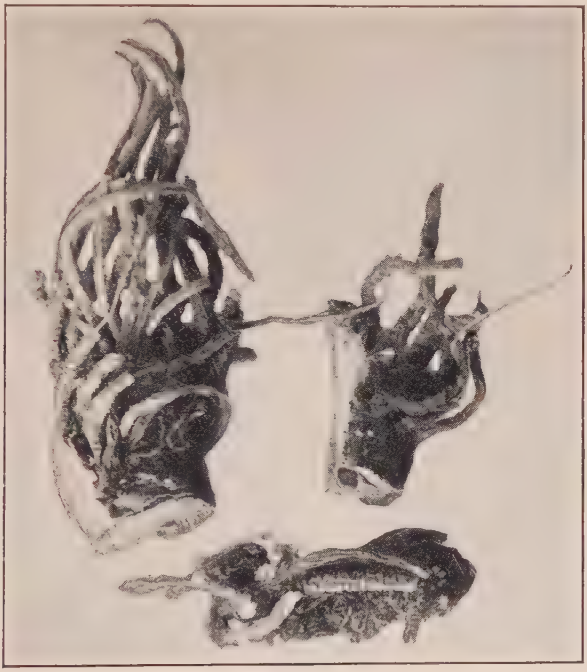

FIG. 7.—Veratrum viride.

DOSE: 1½ gr. (0.1 Gm.).

OFFICIAL PREPARATION: U.S.P. X

Tincture of Veratrum, 15 m. (1 cc.).

CONVALLARIA RADIX

(kŏn′vă-lā′rĭ-ȧ rā′dĭx)

CONVALLARIA ROOT—N.F.

Synonyms: Lily of the Valley; May Lily; Park Lily; Wood Lily.
Source: Convallaria majalis Linné (Fam. Liliaceæ).

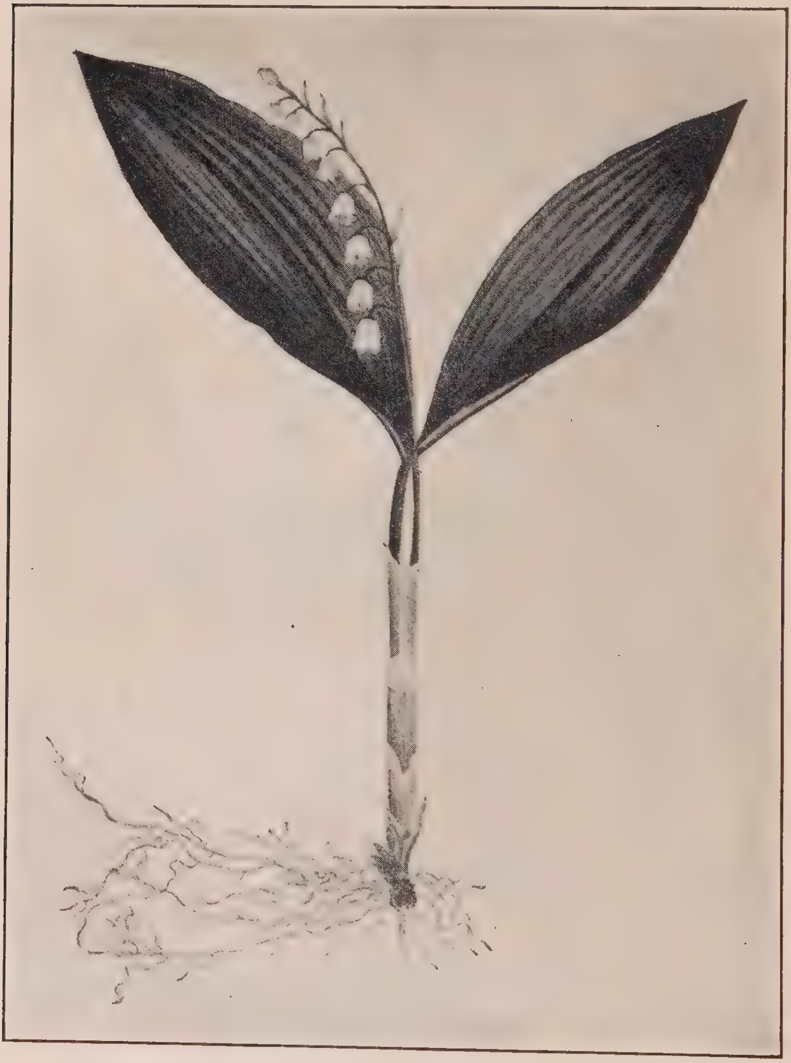

Fig. 8.—Lily of the valley, whole plant. (Courtesy of Parke, Davis & Company.)

Etymology: Convallaria from the Lat. "con," *together with*, and "vallis," *valley*, signifying an enclosed valley, and the Gr. "leirion," *lily*, i.e., it grows in rich, protected places such as valleys.

Majalis from the Lat. "majus," *May*, the time of flowering.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Convallaria Root:* Rhizome horizontal, elongated, usually branched, cylindrical, variable in length, from 1 to 3 mm. in diameter; externally yellowish white or pale brown, with a few circular stem scars, and from 3 to 5 thin, tortuous, dark brown, branching roots arising from the lower portions of the nodes; fracture short or fibrous; internally whitish. Odor faint; taste sweetish, becoming bitter and acrid.

Habitat: United States, Europe, Northern Asia.

Discussion: This is a small, perennial, herbaceous plant which sends up, in early spring, two oblong, bright-green leaves, and in late spring or early summer, a one-sided raceme of beautiful, sweet-scented, bell-shaped flowers. It was thought to have been primarily a native of Europe, but a species found growing in the Alleghany mountains from Virginia to South Carolina seems to be identical in every respect. The importation of convallaria is carried on under the heading of plants rather than of drugs, and is not distinguished from tulips and other lilies so far as the statistics on importations go. Consequently no very accurate estimates can be made on the amounts imported for medicinal use. During the year, 1924, there were imported into the United States 226,471,277 plants of this family.

Constituents: Convallamarin, $C_{23}H_{44}O_{12}$, a bitter glucoside, is the active principle; convallarin, $C_{34}H_{62}O_{11}$, an acrid, colorless glucoside.

Properties and Uses: Convallaria is a heart tonic, similar in its action to digitalis, but is not so cumulative; also less certain and valuable. Thus it is used in cardiac fibrillation, chronic dilatation and rapid heart.

Dose: 8 gr. (0.5 Gm.).

Official Preparation: N.F. V.

Fluidextract of Convallaria Root, 8 m. (0.5 cc.).

SARSAPARILLA

(sär′sȧ-pȧ-rĭl′ȧ)

SARSAPARILLA—U.S.P.

Source: Smilax medica Chamisso and Schlechtendal, known in commerce as Mexican Sarsaparilla; Smilax officinalis Kunth, or an undetermined species of Smilax, known in commerce as Honduras

Sarsaparilla; Smilax ornata Hooker filius, known in commerce as Central American or Jamaica Sarsaparilla (Fam. Liliaceæ).

Etymology: Sarsaparilla from the Sp. "zarza," *a bramble*, "parra," *a vine*, and "illa," *small*, i.e., a small brambly vine.

Smilax, the Gr. name of the yew tree, from "smile," *a scraper*, i.e., the stems are armed with sharp spines.

Ornata from the Lat. "ornare," *to adorn*, referring to its beautiful fruit and foliage.

Medica from the Lat. "medicus," *curative* or *medicinal*.

Part Used: The dried root.

Description and Physical Properties: Sarsaparilla is nearly odorless; taste mucilaginous, somewhat sweetish and acrid.

Unground Mexican Sarsaparilla: Long roots from 3.5 to 6 mm. in diameter, frequently attached to a crown having one or more stout stems; usually shrunken, forming sharp longitudinal ridges and broad furrows; externally light, grayish brown to dark brown; the furrows may contain more or less blackish earth; finely hairy; nearly devoid of branches or fibrous rootlets; fracture of cortex brittle, of central cylinder tough and fibrous; cortex mealy and whitish or brownish and horny; woody zone yellow and porous; pith whitish and distinct.

Unground Honduras Sarsaparilla: Long roots from 2 to 5 mm., rarely 6 mm. in diameter and bound together by roots of the same plant into compact cylindrical bundles from 8 to 15 cm. in diameter; externally reddish brown or dark brown, longitudinally wrinkled or finely furrowed with occasional fibrous rootlets; fracture short, sometimes tough and fibrous in the central cylinder; internally a reddish brown, dark-brown, or occasionally light-gray cortex, a light yellow and porous woody zone and a whitish pith.

Unground Central American Sarsaparilla: Roots long, from 1 to 4, rarely 5 mm. in diameter; externally light brown or reddish brown, longitudinally wrinkled, occasionally nearly smooth, rarely furrowed and bearing numerous coarse fibrous rootlets; fracture short or tough and fibrous in the central cylinder; internally a white or dark-brown cortex, a yellow, porous woody zone and a yellow or white pith.

Habitat: Mexico, Central America, Jamaica.

Discussion: All the medicinal species of smilax are climbing or trailing vines with prickly stems and grow in dense, moist jungles where access is very difficult. They have a short, thick rhizome and many very long, thin roots, sometimes 10 or more feet in length. Since these roots intertwine with those of neighboring plants, collection is very difficult. The drug is collected by the natives who scrape the earth away by hand and dig out the roots with sharpened sticks. During the year 1924, 192,944 pounds of sarsaparilla were imported.

Constituents: Parillin (smilacin), a saponin body, sarsa-saponin, resinous matter.

Properties and Uses: Sarsaparilla is commonly reputed to be a "blood purifier" (alterative) of value, but many therapeutists believe that its medical properties have been greatly exaggerated. Combined with other drugs, such as potassium iodide, mezereum, sassafras and guaiac, however, it is largely employed as an alterative in secondary syphilis and chronic rheumatic conditions.

Official Preparations: U.S.P. X.

Fluidextract of Sarsaparilla, 30 m. (2 cc.).
Compound Syrup of Sarsaparilla, 4 fl. dr. (15 cc.).

HELONIAS

(hē-lō′nĭ-ăs)

HELONIAS—N.F.

Synonyms: False Unicorn; Blazing Star; Stargrass.

Source: Chamælirium luteum (Linné) A. Gray (Fam. Liliaceæ).

Etymology: Helonias from the Gr. "elos," *marsh*, i.e., growing in marshy places.

Chamælirium from the Gr. "khamai," *on the ground*, and "leirion," *lily*, i.e., ground-lily.

Luteum from the Lat. "lutum," *mud*, i.e., grows in wet or marshy ground.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Helonias:* Rhizome upright, or oblique, sometimes nearly cylindrical, from 0.5 to 3 cm. long and about 1 cm. in diameter; externally grayish brown; annulate from scars of bud-scales; upper portion with leaf bases enclosing a small bud; oblique rhizomes with a few stem scars up to 7 mm. in diameter; lower portion with numerous whitish or pale-yellowish, slightly curved, wiry roots, from 5 to 8 cm. long, arising from deep pits in the rhizome and with cortex usually detached; fracture hard and horny; internally grayish yellow, cortex from 3 to 4 mm. thick. Odor slight; taste bitter, slightly astringent.

Habitat: Eastern United States.

Discussion: False unicorn is a beautiful, perennial herbaceous plant growing in marshy meadowlands in many localities of the eastern United States. The stem is glabrous and rises from a rosette of basal leaves to a height of from 12 to 20 inches, terminating in a spike-like raceme of small, white flowers. The rhizome is very small, grayish-brown externally and distinctly annulate from scars of bud-scales.

Constituents: Chamælirin, an amorphous, yellowish-red glucoside, belonging to the saponin group, 10 per cent. The Eclectics prepare an extract of the drug known as "*helonin.*"

Properties and Uses: Helonin is used by the Eclectics in the treatment of atony of the gastro-intestinal and genito-urinary tracts;

also in cases of dropsy. It possesses some vermifuge action, especially against the tapeworm.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Compound Elixir of Aletris, 1 fl. dr. (4 cc.).
Compound Elixir of Helonias, 1 fl. dr. (4 cc.).
Fluidextract of Helonias, 30 m. (2 cc.).

ALLIUM

(ăl'ĭ-ŭm)

GARLIC—N.F. ✓

Synonym: Poor man's Treacle.

Source: Allium sativum Linné (Fam. Liliaceæ).

Etymology: Allium, or alium, the Lat. for "*garlic.*"
Sativum from the Lat. "sativus," *cultivated,* from "serere, satum," *to sow.*

Part Used: The fresh bulb.

Description and Physical Properties: *Whole Garlic:* Bulb subglobular, 4 to 6 cm. in diameter, compound, with 8 to 15 bulbels surrounded by whitish, membranaceous scales and attached to a flattened circular base, the latter with numerous yellowish white roots; bulbels ovoid in transverse section 3- to 4-sided, the outer surface convex, apex acute and narrowed into a thread-like fibrous portion, base truncate; each bulbel covered by whitish, membranaceous, scale-like leaves, beneath which is a light-brown or pinkish, thin and coriaceous layer of epidermis, cohering but easily separable from the solid portion of the bulbel. Odor when broken or bruised powerfully alliaceous, taste intensely pungent and persistent.

Habitat: Central Asia, Southern Europe. Widely cultivated.

Discussion: Garlic is a perennial, herbaceous plant growing from 1 to 2 feet in height. The leaves are long and grass-like. The small, white flowers occur in umbels. The bulb is composed of a number of bulblets, known as "*cloves,*" all covered by a number of membranous scales and attached to a circular, button-like base from the under side of which the roots proceed. The odor is strong and pungent, somewhat similar to, but more pronounced than, that of an onion.

Constituents: Volatile oil, 0.09 per cent; albumin; mucilage, 0.35 per cent. The oil is classed with the malodorous volatile oils and contains a series of sulphur compounds as follows: $C_6H_{10}S_2$; $C_6H_{12}S_2$; $C_6H_{10}S_3$; $C_6H_{10}S_4$.

Properties and Uses: Garlic has a number of therapeutic properties, some of them possessing considerable merit. Applied locally, as a poultice, it is irritant and rubefacient. Thus it is applied to the chest as a treatment for bronchitis and other forms of respiratory inflammations. Internally it is condiment and carminative, increasing the appetite and aiding digestion. It is employed as an article of diet in many parts of the world much the same as onions are in this country.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Syrup of Garlic, 1 fl. dr. (4 cc.).

ALETRIS

(ăl′ē̇-trĭs)

ALETRIS—N.F.

SYNONYMS: Unicorn Root; Star Grass; Colic Root; Blazing Star.

SOURCE: Aletris farinosa Linné (Fam. Liliaceæ).

ETYMOLOGY: Aletris from the Gr. "aletris," *a slave who grinds corn,* so named from the floury appearance of the blossoms.

Farinosa from the Lat. "farina," *flour* or *meal,* i.e., floury, referring to the appearance of the blossoms.

PART USED: The dried rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Aletris:* Rhizome horizontal or slightly oblique, nearly cylindrical or laterally compressed above, 2 to 4 cm. in length and 5 to 12 mm. in diameter; externally grayish brown; upper portion with circular stem scars 3 to 7 mm. in diameter and with numerous leaf bases; the sides and lower portion with numerous tough, wiry, whitish roots which are reddish brown when the cortex is removed and are more or less flexuose and provided with short branches; fracture short; internally light brown, cortex 1 to 2 mm. in thickness, central cylinder with numerous twisted and branching fibro-vascular bundles. Odor slight, acetous; taste sweetish, bitter.

HABITAT: Eastern United States.

DISCUSSION: Aletris is a perennial, herbaceous plant growing from 2 to 3 feet in height. It has spreading lanceolate leaves radiating like the points of a star. The long, slender scape is terminated by a raceme of small, white flowers which have the appearance of having been sprinkled with flour. The rhizome is grayish-brown externally and consists of from 4 to 6 distinct joints. It breaks with a mealy fracture and has a bitter, starchy taste.

CONSTITUENTS: Bitter principle; starch.

PROPERTIES AND USES: Aletris is a simple bitter and stomachic tonic. It has also been recommended as a uterine tonic of service in amenorrhœa and dysmenorrhœa.

Official Preparations: N.F. V.
Compound Elixir of Aletris, 1 fl. dr. (4 cc.).
Compound Elixir of Viburnum Opulus, 1 fl. dr. (4 cc.).
Fluidextract of Aletris, 30 m. (2 cc.).

TRILLIUM

(trĭl'ĭ-ŭm)

TRILLIUM—N.F.

Synonyms: Bethroot; Birthroot; Wake Robin; Indian Shamrock.

Source: Trillium erectum Linné, and other species of Trillium (Fam. Liliaceæ).

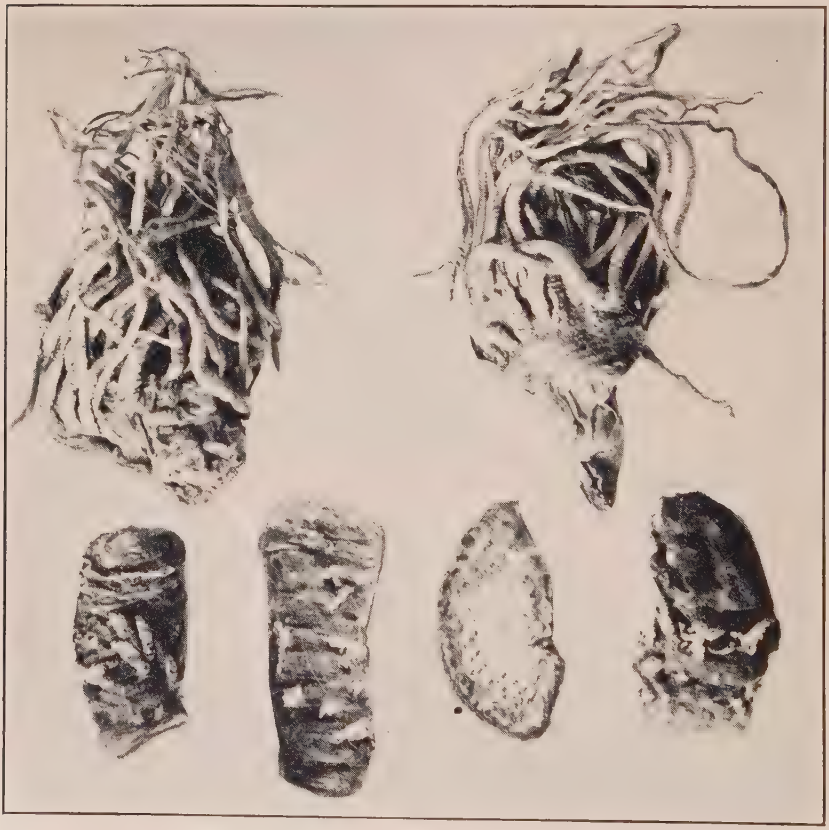

Fig. 9.—Trillium. Upper specimens with roots attached. Lower row represents the official drug with roots removed.

ETYMOLOGY: Trillium from the Lat. "tri," *three*, so-called from the fact that it has but three leaves.

Erectum from the Lat. "erectus," p.p. of "erigere," *to erect*, i.e., having a vertical position.

PART USED: The dried rhizome.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Trillium:* Rhizome oblique, globular, oblong or obconical, truncate below, terminated at the top by a small bud surrounded by a sheath of scarious leaf bases, annulated by leaf scars and fissured by stem scars; from 0.6 to 5 cm. in length, and from 1 to 3 cm. in width, more or less compressed laterally; rootlet scars in several concentric rows on the under side in the upper portions; externally yellowish to reddish-brown; internally of a pale-yellow; fracture somewhat uneven with a hard and close texture or a more or less spongy appearance. Odor distinct; taste bitter and acrid with a sensation of warmth in the throat, and when chewed causing an increased flow of saliva.

HABITAT: Northeastern United States and Canada.

DISCUSSION: This is a perennial, herbaceous plant growing about a foot in height. The stem is stout and erect, bearing a whorl of three leaves at its summit and subtending a single, ill-scented flower of purplish color. The rhizome is short and fleshy, varying from 1 to 2 inches in length.

CONSTITUENTS: Saponin, about 5 per cent; resin; starch; volatile oil; astringent principle.

PROPERTIES AND USES: Trillium was used by American Indians in parturition, hence its name, *birth root.* Has found use in uterine diseases, hemorrhage and as astringent in diarrhea. It is but little used in this country.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Fluidextract of Trillium, 30 m. (2 cc.).

Compound Elixir of Viburnum Opulus, 1 fl. dr. (4 cc.).

CHAPTER VII

IRIDACEÆ
(ī′rĭ-dā′sē̇-ē)

IRIS FAMILY

This family is widely distributed and consists of perennial herbs, constituting about 60 genera and over 900 species. They have equitant, 2-ranked leaves and perfect, bracted, often very beautiful, flowers. Several of the genera, as the Iris, Crocus, and Gladiolus, are widely cultivated for the beauty of their flowers.

IRIS
(ī′rĭs)

ORRIS—N.F.

Synonyms: Orris Root; White Flag.

Source: Iris florentina Linné, Iris germanica Linné, or Iris pallida Lamarck (Fam. Iridaceæ).

Etymology: Iris from the Lat. "Iris, Iridis," *the goddess of the rainbow*, from the Gr. "Iris, Iridos"; also the iris of the eye, referring to the varied colors of the flower.

Florentina, of or related to the City of Florence.

Germanica, of Germanic origin.

Pallida from the Lat. "pallidus," *pale*, referring to the color of the flowers.

Part Used: The rhizome freed from roots, peeled and dried.

Description and Physical Properties: *Unground Orris:* In pieces of various forms and sizes, usually jointed and branched, from 5 to 10 cm. long and from 1.5 to 3 cm. wide, rounded or flattened, with knotty enlargements; under surface with numerous root scars, the upper with leaf scars; externally yellowish white; internally light yellow; fracture hard, rough and at times mealy, showing a narrow cortex, a distinct endodermis and a large stele with numerous vascular bundles, especially near the endodermis. Odor fragrant, resembling that of violet flowers; taste slightly aromatic, bitterish, somewhat irritating.

Habitat: Italy, Germany, France.

Discussion: Iris florentina is a perennial, herbaceous plant growing from 20 to 30 inches in height. It has radical, sword-shaped leaves somewhat shorter than the stem. The stem terminates in two large, white or pale-blue flowers. They are grown for their beauty as well as for the commercial value of the rhizomes. The latter are gathered in the fall. The outer bark is removed by scraping, after first being soaked in water. They are then very carefully dried, the characteristic aroma being developed during the curing process.

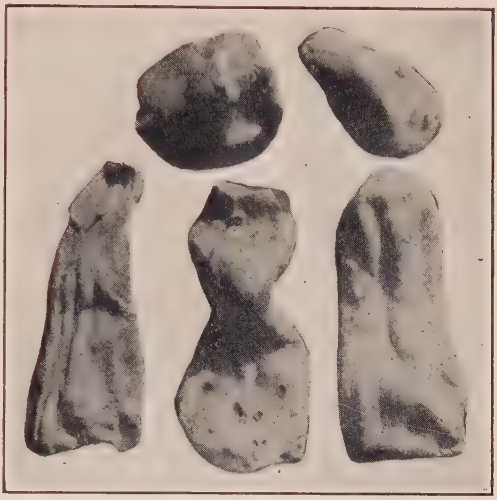

Fig. 10.—Orris.

Constituents: Volatile oil; resin; starch; bitter, acrid fixed oil; tannin. The volatile oil is fat-like in consistency and seems to be developed during the distillation process. It is known as "*orris butter*" and contains, among other constituents, about 85 per cent of myristic acid. It also contains a trace of irone ($C_{13}H_{20}O$) to which the pleasant, violet-like odor is due. Ionone, a synthetic isomer of irone and having the same odor, is used largely in the perfume industry.

Properties and Uses: The fresh rhizome is cathartic and emetic, but is rarely employed as such. The powdered rhizome enters into the composition of tooth, baby and sachet powders. Orris root is used chiefly in the perfume industry.

Official Preparation: N.F. V.

Pectoral Species, 1 dr. (4 Gm.).

IRIS VERSICOLOR

(ī′rĭs vûr′sĭ-kŭl′ẽr)

BLUE FLAG—N.F.

Synonyms: Water Flag; Flag Lily.

Source: Iris versicolor Linné, or Iris caroliniana Watson (Fam. Iridaceæ).

Etymology: Iris from the Lat. "iris, iridis," *the rainbow*, referring to the variegated colors of the flowers.

Versicolor from the Lat. "versare," *to change*, and "color," *color*, referring to the variegated colors of the flowers.

Part Used: The dried rhizome.

Description and Physical Properties: *Unground Blue Flag:* Rhizome frequently branched, up to 20 cm. in length and 3 cm. in thickness at the nodes, usually cut into longitudinal pieces; outer surface grayish brown to purplish brown, somewhat annulate, the upper surface with markings of leaf bases, the lower with numerous root scars and root remnants; fracture short, the broken surface yellowish white, pink or pale to dark purplish brown and exhibiting a central stele with whitish fibrovascular bundles distributed throughout, a distinct endodermis, and cortex. Odor slight, not distinctive; taste acrid, nauseous.

Habitat: North America.

Discussion: This is a perennial, herbaceous plant growing from 2 to 3 feet in height. It grows abundantly in low, swampy places throughout the eastern and central portions of the United States. It has equitant, sword-shaped leaves and large, lily-like flowers which are blue, variegated with yellow and white, at the base of the sepals. The rhizome is from 2 to 4 inches in length, joined and annulated. It has a slight peculiar odor and an acrid, nauseous taste.

Constituents: Resin, 25 per cent; oil; starch; tannin.

Properties and Uses: Blue flag is cathartic, alterative and emetic.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Compound Elixir of Corydalis, 1 fl. dr. (4 cc.).
Fluidextract of Blue Flag, 30 m. (2 cc.).
Compound Fluidextract of Stillingia, 30 m. (2 cc.).
Compound Syrup of Stillingia, 1 fl. dr. (4 cc.).

CROCUS

(krō'kŭs)

SAFFRON—N.F.

Synonym: Spanish Saffron.

Source: Crocus sativus Linné (Fam. Iridaceæ).

Etymology: Crocus, the Lat. for "*saffron*," from the Gr. "krokos" (Heb. "karkom," Skr. "kunkuma"), the name of the plant.

Sativus, the Lat. for "*cultivated*," from " serere, satum," *to sow.*

Iridaceæ from the Lat. "Iris, Iridis," *the goddess of the rainbow,* from the Gr. "iris, iridos," the iris of the eye. In classical mythology, the goddess of the rainbow, in the Iliad, the swift-footed messenger of Zeus and Hera, referring to the variety of colors of the flowers of certain of the species.

Part Used: The stigmas without more than 10 per cent of the styles.

Description and Physical Properties: *Unground Saffron:* Stigmas 3, united or separate, attached to the apex of the style; usually about 25 mm. long, cornucopia-shaped, of a dark, rich red color, the margin dentate or fimbriate; styles about 10 mm. long, more or less cylindrical, solid, yellowish. Odor strong, peculiarly aromatic; taste bitterish, aromatic. When chewed it colors the saliva orange-yellow.

Habitat: Spain, France, Western Asia. Extensively cultivated in Asia and Southern Europe.

Discussion: Crocus sativus is a perennial, herbaceous plant with a solid corm or bulb about 1 inch in diameter. The leaves are grass-like in appearance and the flowers a light-purplish color. The drug consists of the stigmas, usually attached to a very short portion of the style. The stigmas, individually, are seen under the microscope to consist of a funnel-like, tubular tissue, irregularly notched at the top and somewhat flattened at the bottom. It is estimated that the stigmas of 4000 flowers are required to yield one ounce of dry saffron. Since they must be removed from the flowers by hand, it is at once seen what an enormous amount of careful, pains-taking labor is involved in collecting this drug.

On account of the high price paid for saffron it has frequently been adulterated; in fact the practice dates back to the middle ages. As the drug was held in high esteem, its sophistication was considered a serious crime and historians record the imposition of the death penalty upon those found guilty of debasing saffron. Many adulterants have been detected, the more common being dried beef fibers, colored chalk and barium sulphate, crocus stamens, the florets or styles and stigmas of other species, suitably colored to immitate true saffron. Fixed oil and glycerin have also been found, but may be readily detected by pressing the drug gently between filter-papers and noting the stain.

CONSTITUENTS: Volatile oil; crocin, $C_{44}H_{70}O_{28}$, a yellow coloring matter; picro-crocin, a glucoside yielding volatile oil and fructose on hydrolysis; fixed oil.

PROPERTIES AND USES: Saffron was held in high repute in olden times as an emmenagogue and nerve sedative but it has practically been abandoned by practitioners. It is still employed in domestic medicine in the form of a "tea" to promote eruptions as in the case of measles. Its principal employment at the present time is as a coloring and flavoring agent.

OFFICIAL PREPARATIONS: N.F. V.
- Antiperiodic Pills, 1 pill.
- Antiperiodic Pills without Aloe, 1 pill.
- Antiperiodic Tincture, 1 fl. dr. (4 cc.).
- Antiperiodic Tincture without Aloe, 1 fl. dr. (4 cc.).
- Tincture of Opium with Saffron, 10 m. (0.6 cc.).
- Tincture of Saffron (no dose official).

CHAPTER VIII

DIOSCOREACEÆ

(dī′ŏs-kō′rē̇-ā′sē̇-ē)

YAM FAMILY

This family numbers 9 genera and about 175 species. The members are twining plants with large tuberous roots, or knotted root-stocks, and are distinguished by their netted-veined leaves and small diœcious flowers. Most species are native of tropical America, especially South America and the West Indies.

DIOSCOREA

(dī′ŏs-kō′rē̇-ȧ)

DIOSCOREA—N.F.

Synonyms: Wild Yam; Colic Root; Rheumatism Root.

Source: Dioscorea villosa Linné (Fam. Dioscoreaceæ).

Etymology: Dioscorea, named in honor of Dioscorides, the Greek herbalist.

Villosa from the Lat. "villosus," *hairy*, i.e., covered with hairs, velvet-like.

Part Used: The dried rhizome.

Description and Physical Properties: *Unground Dioscorea:* Knotted and woody, elongated, 6 to 20 mm. thick, often compressed, bent and branched, bearing scattered nodular projections, slender tough roots or thorn-like root-remains in circular depressions on the sides and underneath, and stem scars on the upper surface; externally pale brown, surface more or less scaly from the partly detached, thin outer layer; fracture short but tough, the fractured surface whitish or pale yellowish, with numerous small, scattered, yellowish wood bundles. Odorless; taste starchy, insipid, afterwards acrid.

Habitat: Eastern and Central United States.

Discussion: This is a perennial, herbaceous plant with very slender twining stems. The leaves are broadly ovate and have from nine to eleven ribs. The small, greenish flowers occur in slender, drooping panicles. The drug occurs in knotted, woody sections about 2 inches in length. It is practically odorless and has an insipid, afterwards acrid, taste.

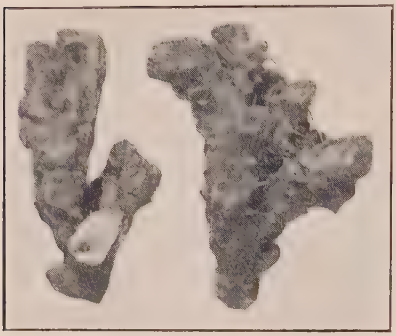

Fig. 11.—Dioscorea.

Constituents: Resin, a saponin-like body.

Properties and Uses: Considerable doubt seems to exist as to the therapeutic value of dioscorea. It is believed by the Eclectics to have antispasmodic value and to be a specific in certain forms of colic.

Dose: 60 gr. (4 Gm.).

Official Preparations: N.F. V.
Fluidextract of Dioscorea, 1 fl. dr. (4 cc.).
Compound Tincture of Viburnum, 1 fl. dr. (4 cc.).

CHAPTER IX

PALMÆ

(pålm-ē)

PALM FAMILY

This family comprises about 1000 species, mostly tropical or subtropical shrubs or trees. They have simple, unbranched trunks, bearing at the summit, a cluster of large pinnate (feather palms) or palmate (fan palms) leaves. Some, as the Saw Palmetto, are low-growing, while other species attain a height of 100 or more feet. The leaves stand on long petioles which completely sheath the stem. The flowers are small and inconspicuous. The fruit is either a berry (as in the date palm), or a drupe (as in the coco-nut palm).

COCO-NUT

(kō′kȯ-nŭt′)

COCO-NUT

Source: Cocos nucifera Linné (Fam. Palmæ).

Etymology: Cocos from the Pg. "coco," *a bugbear,* an ugly mask to frighten children, given because of the monkey-like face at the base of the nut.

Nucifera from the Lat. "nux," *a nut,* and "ferens," *bearing.*

Part Used: Nearly all parts of the plant are used for one purpose or another, but only the oil obtained from the nut is used in pharmacy.

Habitat: The coco palm grows in the tropics in a zone extending about 25° on each side of the equator, in seacoast regions.

Discussion: The spelling *cocoa* appeared first in Johnson's dictionary, probably as a mistake, and later became the more common spelling; *coco,* however, is the spelling preferred by careful writers. The coco palm is a tall, stately tree, devoid of branches, and bearing at the top a tuft of large, plaited leaves among which as many as 100 fruits are borne each year. It is supposed to have originated in the East Indian Archipelago or Polynesia and to have become distributed by ocean currents carrying the seeds to the coast of Africa and to the far-off shores of America. The character of the fruit is highly favorable to its distribution by the sea since the seed is protected by a strong shell which is inclosed in a light, porous husk, and this, in turn, is protected by a smooth, glossy cuticle which is impervious to water.

There is probably no other plant in the whole vegetable kingdom which supplies mankind with so many useful things, and no other is so completely utilized. The trunk of the tree supplies a good grade of lumber. The wood is very hard and takes a beautiful polish which makes it a favorite in cabinet work. The sap, which contains sugar, is fermented to a wine called "*palm wine*" which is similar to Tokay. This wine may be further fermented for the production of vinegar. The wine is also distilled to produce a sort of brandy called "*arrack*." All members of the palm family store up reserve starch in their stems. In certain of the species this is utilized to form a product similar to tapioca.

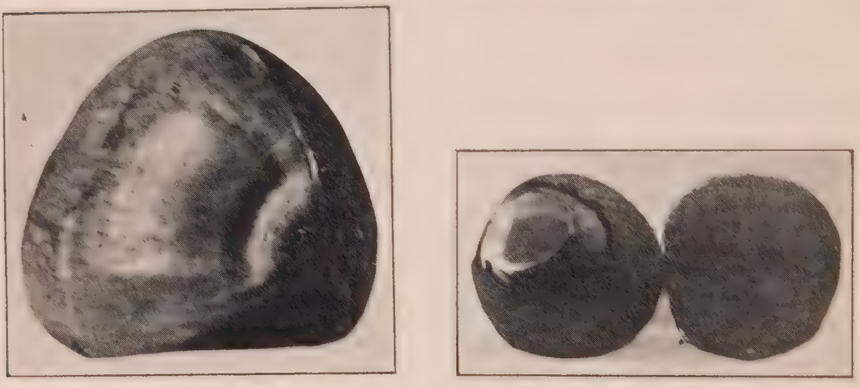

Fig. 12.—Coco-nut. Left, whole fruit; right, the nuts. One of the latter is broken open to show the white endosperm.

The fiber from the husk surrounding the nut is used to make cordage, coarse cloth, brushes and matting. The natives use the shells for ornaments, buttons, cups and other culinary utensils. The milk from the interior of the nut is much used by travelers as a drink. The edible endosperm (called *copra*) not only supplies an article of food in itself, but, when shredded, sweetened and dried, is used in cooking and pastry throughout the civilized world. The oil which is expressed from the endosperm is used in the manufacture of soap and candles, and in pharmacy as an ointment base. For this latter purpose, it possesses several advantages, viz., (*a*) it does not readily become rancid; (*b*) it is readily absorbed by the skin; (*c*) it does not induce chemical change when mixed with most substances; (*d*) it will take up considerably more aqueous solution than an equal amount of lard. The residue left after the expression of the oil is called "*coconut oil cake*" and is used as a stock food and as a fertilizer. The importation of coconut meat (endosperm) for the year 1924, amounted to 47,302,393 pounds.

SANGUIS DRACONIS

(săn′gwĭs drȧ-cō′nĭs)

DRAGON'S BLOOD

Source: Calamus Draco Linné (Fam. Palmæ).

Etymology: Sanguis, the Lat. for *blood*, referring to the color of the juice.

Draco and draconis, the nominative and genitive, respectively, of the Lat. for *dragon*.

Calamus, the Lat. for *reed, stem* or *stalk*, referring to the character of the plant.

Part Used: The resin from the fruit.

Habitat: Borneo, Sumatra.

Discussion: This product is a spontaneous resinous exudation from the ripening fruit. As the fruits ripen a red juice exudes and becomes encrusted upon the surface. They are then collected and shaken in a bag whereby the resinous concretion is broken off. The resinous matter is then warmed and molded into sticks or cakes which are wrapped in strips of palm leaf and tied with a slender strand of cane fiber.

After the removal of the greater portion of the resin in this manner the fruits are boiled in water and a second portion of resin obtained. This is of an inferior quality and is generally run into circular cakes 2 or 3 inches in diameter. 41,653 pounds of dragon's blood were imported in 1924.

Constituents: Draconin (a red resin), about 90 per cent; fixed oil, 2 per cent; benzoic acid, cinnamic acid (sometimes no acid is present).

Properties and Uses: On account of its stimulating and mildly astringent properties, this resin formerly was used as an ingredient of dental powders, tooth pastes, mouth washes, etc. It is now used almost exclusively in paints and varnishes.

SABAL
(sā′băl)

SABAL—N.F.

Synonyms: Saw Palmetto; Scrub Palmetto; Dwarf Palmetto; Fan Palm.

Source: Serenoa serrulata (Michaux) Hooker filius (Fam. Palmæ).

Etymology: Serenoa, given in honor of Prof. Sereno Watson, a noted botanist and author.

Serrulata from the Lat. "serratus," *saw-like,* from "serra," *a saw,* referring to the character of the margin of the leaf.

Palmetto from the Sp. "palmito," *a little palm tree.*

Sabal is the native South American name of the tree.

Part Used: The partially dried, ripe fruit.

Description and Physical Properties: *Unground Sabal:* Ellipsoidal or ovoid, occasionally compressed, from 1.5 to 3 cm. in length and from 1 to 1.5 cm. in diameter; externally brownish black to bluish black, smooth and somewhat oily, with a few large, more or less angular depressions due to the contraction of the sarcocarp, apex marked by the scar of the style, and the base either with a short stalk or stem scar; epicarp and sarcocarp together forming a thin coriaceous shell enclosing a hard but thin endocarp, which is externally reddish brown and somewhat fibrous as is also the inner layer of the sarcocarp; inner layer of endocarp smooth, enclosing a hard, ellipsoidal or ovoid, somewhat flattened, reddish-brown seed. Odor pronounced, aromatic; taste sweetish, aromatic, slightly acrid.

Habitat: Along the Atlantic coast from South Carolina to Florida, and in the West Indies. It grows only on the sandy soil near the seacoast.

Discussion: This is a low, scrubby palm with a creeping horizontal, or subterranean, stem from 6 to 10 feet in length and 4 to 6 inches in thickness. It has a crown of large leaves at the outer end, rising vertically from the stem. The leaves have long petioles and a circular fan-shaped leaf blade which is split at the edge into from fifteen to thirty divisions. The fruit is a dark-brown drupe about the size and shape of a large olive and is somewhat wrinkled on the surface due to drying. The fruits occur on a large panicle proceeding from amid the crown of leaves. In some places along the Florida coast the jungles of saw palmetto are so thick and the leaves, with their saw-like edges, so dense as to make them almost impenetrable to man or beast.

Constituents: Fixed oil, 12 to 15 per cent; volatile oil, 0.5 to 1 per cent; fat; glucose.

Properties and Uses: Sabal is claimed to be expectorant and anti-catarrhal and is used in irritated conditions of the mucous membranes of the nose, throat, larynx and bronchi. It is employed in inflammatory conditions of the genito-urinary tract in the same way as santal oil, cubebs and copaiba although the latter are more active.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Compound Elixir of Sabal and Sandalwood, 1 fl. dr. (4 cc.).
Fluidextract of Sabal, 15 m. (1 cc.).
Tincture of Saw Palmetto and Sandalwood, 1 fl. dr. (4 cc.).

CHAPTER X

GRAMINEÆ

(grȧ-min′ė̄-ē)

GRASS FAMILY

This is a widely distributed family comprising about 4000 species. They are nearly all herbaceous, annual or perennial plants with cylindrical, usually hollow, stems closed at the nodes and having alternate leaves which are attached to the stem by means of long sheaths. The flowers are borne in spikelets, both stamens and pistils occurring in the same flower. The family is a very important one, supplying all the various cereal grains and forage crops.

(*a*) ZEA

(zē′ȧ)

ZEA—N.F.

(*b*) AMYLUM

(ăm′ĭ-lŭm)

STARCH—U.S.P.

Synonyms: (*a*) Corn Silk; Stigmata Maydis.
(*b*) Corn Starch.
Source: Zea Mays Linné (Fam. Gramineæ).
Etymology: Zea from the Gr. "zea, zeia," *barley*.

Mays from the Sp. "maiz," from "mayz," the native name in the Antilles.

Amylum, the Lat. for *starch* from the Gr. "amylon," *a fine meal*, from "a," *not*, and "myle," *a mill*, i.e., not ground at the mill.

Gramineæ from the Lat. "gramen, -minis," *grass*.

Part Used: (*a*) The fresh styles and stigmas.
(*b*) The starch obtained from the grain.

Description and Physical Properties: (*a*) In slender filaments from 10 to 20 cm. in length and about 0.4 mm. in diameter; of a light-green, purplish-red, yellow or light-brown color; stigmas bifid, the segments very slender, frequently unequal, and from 0.4 to 3 mm. in length.

(*b*) In irregular, angular white masses or in fine powder; consisting chiefly of polygonal, rounded or spheroidal starch grains from 0.003 to 0.035 mm. in diameter and usually with a lenticular or 3- to several-rayed central cleft; inodorous; taste characteristic, slight.

Starch is insoluble in cold water and in alcohol.

The individual grains of Starch are colored a deep-blue by iodine T.S.

HABITAT: Native in America. Now grown throughout the world wherever the climate is suitable.

DISCUSSION: These products are obtained from the ordinary maize or *Indian corn.* It is, strictly speaking, an American plant and is called "Indian corn" because originally used by the aborigines of this continent. Columbus took samples of corn to Spain on his return in 1520 and within a very short time it had spread over Southern Europe, Northern Africa and Western Asia. Corn has been found in the tombs of the ancient Peruvians and in the mounds of the Aztecs of the Mississippi valley.

The female inflorescence, out of which the fruit is developed, is a close axillary spike inclosed in a mass of spathe-like bracts called "*husks.*" The filiform styles and stigmas extend far beyond the orifice of the bracts and form the "*silk.*" The tassel, at the top of the stalk, bears the male inflorescence.

The fruit or kernel of corn contains abundant starch, the central portion of the endosperm being mealy while the outer part is hard and horn-like. The starch grains of the mealy portion are more or less rounded, while those of the horny part are angular, due to the compact state of aggregation. In the germ of the corn there is about 20 per cent of a fixed oil which is only slightly drying and which is now extensively used in commercial enterprises of various sorts. For the recovery of the oil the germ is carefully and completely separated from the endosperm by machinery. It is then ground and subjected to enormous pressure. The residue left after the expression of the oil is called "*oil cake*" and is valuable as a cattle food. The oil has been used as a substitute for some of the other fixed oils since it is cheap. It is now largely employed in cooking and as a salad oil. Notwithstanding the enormous quantities of corn raised in this country, some starch is imported each year as shown by the statistics of our Department of Foreign Commerce and Navigation.

CONSTITUENTS: (*a*) Corn silk; maizenic acid; fixed oil.

(*b*) Starch has the formula $C_6H_{10}O_5$.

PROPERTIES AND USES: (*a*) Corn silk possesses a soothing, demulcent action in addition to its diuretic and lithontriptic properties. Therefore it is used in inflamed conditions of the urinary passages for both chronic and acute cystitis, gonorrhœa and uric acid or phosphatic gravel. It is also slightly stimulant to the heart which, together with the diuretic action, renders it serviceable in dropsy due to heart disease. (*b*) Corn starch is demulcent, protective and absorbent. Its use is mainly external to allay the intense itching of erysipelas, smallpox, erythema and urticaria. A starch solution is also injected into the rectum or urinary bladder to quiet inflammation. It may also be drunk as an antidote to iodine poisoning.

DOSE: (*a*) Corn silk, 1 dr. (4 Gm.).
(*b*) Ad libitum. (No official dose.)

OFFICIAL PREPARATIONS: U.S.P. X.
(*a*) Compound Elixir of Sabal and Sandalwood, 1 fl. dr. (4 cc.).
Fluidextract of Zea, 1 fl. dr. (4 cc.).
N.F. V.
(*b*) Glycerite of Starch.

TRITICUM

(trĭt′ĭ-kŭm)

TRITICUM—N.F.

SYNONYMS: Couch Grass; Dog Grass; Witch Grass; Quitch.

SOURCE: Agropyron repens (Linné) Beauvois (Fam. Gramineæ).

ETYMOLOGY: Triticum, the Lat. for *wheat*, from "tritus," p.p. of "tero, terere," *to rub, grind* or *thresh*, i.e., the grain must be threshed or ground before it is suitable for food.

Agropyron from the Gr. "agros," *a field*, and "pyros," *wheat*, i.e., wild wheat.

Repens from the Lat. "repo," *to creep* or *crawl*, i.e., the stems crawl along the ground.

PART USED: The dried rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Triticum:* Rhizome; usually in pieces from 4 to 12 mm. in length and from 1 to 2.5 mm. in diameter; externally light yellow or yellowish brown, longitudinally furrowed, smooth, lustrous, nodes with circular leaf scars, a few root scars and occasional slender roots; fracture tough, fibrous; internally lemon yellow and with a large, hollow pith. Roots filiform, irregularly branching, attaining a length of about 5 cm., and not more than 0.5 mm. in thickness, light brown or yellowish brown, frequently covered with long root-hairs. Odor slight, aromatic; taste sweetish.

HABITAT: Europe, United States.

DISCUSSION: Triticum is a grass closely resembling Bermuda grass. It is native in Europe, but has been naturalized in the United States, in many localities of which it is regarded as a troublesome weed. The leaves have the same general shape as our common lawn grass, but are flat and rough. The stem creeps along the ground, sending out roots at each node or joint.

CONSTITUENTS: Triticin, a gum-like substance resembling inulin and convertible into levulose, 8 per cent; acid malates of sodium and potassium.

PROPERTIES AND USES: Triticum is employed as a soothing demulcent beverage in fevers as well as for diluting the urine. It is of uncertain value as a diuretic.

DOSE: $2\frac{1}{2}$ dr. (10 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Elixir of Sabal and Sandalwood, 1 fl. dr. (4 cc.).
Fluidextract of Triticum, $2\frac{1}{2}$ fl. dr. (10 cc.).

AVENA SATIVA

(ȧ-vē′nȧ să-tī′vȧ)

OAT—N.F.

SOURCE: Avena sativa Linné (Fam. Gramineæ).

ETYMOLOGY: Avena, the Lat. for "*oat.*"

Sativa from the Lat. "sativus," *sown* or *cultivated*, from "satere," *to sow* or *scatter seed.*

PART USED: The grain.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Oat:* Pale-yellow or pale-yellowish-green; up to 1.5 cm. in length and about 3 mm. in diameter, tapering toward each end; the base somewhat contracted, slightly protruding and with an elliptical scar; the apex pointed, showing the more or less broken upper part of the lemma and palet, the former surrounding the grain except on the ventral side where there is a distinct longitudinal groove, the latter usually exhibiting a minute stalk at the base; outer surface of the lemma glabrous with five or more longitudinal veins on the dorsal surface; above the center, a scar or, rarely, remains of a straight or slightly twisted awn (presence of strongly twisted awn indicates *Wild Oat*); within the groove a narrow, thinly membranous, two-veined palet or scale; fruit or naked grain tapering toward either end, a distinct longitudinal groove on the ventral side, at the micropylar end of which occurs a wart-like excrescence or caruncle, at the opposite end a dense mass of long slender hairs which also occur less abundantly over the surface of the fruit. Odor slight; taste starchy.

HABITAT: Cultivated in nearly all temperate climates.

DISCUSSION: This plant and its grain are so well-known and so extensively cultivated in this country that any description here seems quite unnecessary.

Constituents: Starch, about 55 per cent; cellulose, 11 per cent; nitrogenous constituents, 10 per cent; fat; sugar; gum and dextrin. A nitrogenous principle called "avenin" and apparently belonging to the group of globulins designated as "edestins," is claimed as a constituent of the grain.

Medicinal Properties and Uses: Oat, or "oats," as the grain is most commonly designated in commerce, is used extensively in the form of rolled, crushed or cut oatmeal for human food. It constitutes one of our common cereals. Likewise, the threshed grain is fed to work horses, and, to a less extent, to domestic cattle. In a medicinal way it finds very little use except as a very mildly laxative food, this property being supplied by the large percentage of indigestible residuum of the various types of oatmeal. It has been claimed to possess diuretic properties, but its utility for that purpose is questionable.

Dose: 60 gr. (4 Gm.).

Official Preparations: N.F. V.

Elixir Hydrastis Compound, 1 fl. dr. (4 cc.).
Fluidextract of Oat, 1 fl. dr. (4 cc.).

MALTUM

(môl-tŭm)

MALT—U.S.P.

Synonyms: Barley Malt; Hordeum Decorticatum; Maltum Hordei.

Source: Hordeum vulgare Linné (Fam. Gramineæ).

Etymology: Hordeum, the Lat. classical name of barley, from "horrere," *to bristle up*, i.e., the heads or spikelets are armed with bristle-like beards.

Vulgare from the Lat. "vulgus," *the multitude, the common people*, i.e., denoting the common or usual kind.

Part Used: The grain of one or more varieties of barley which has been partially germinated artificially and dried.

Description and Physical Properties: Yellowish or amber-colored grains. Malt is crisp when broken, the interior surface being nearly white. It has an agreeable, characteristic odor and a sweet taste, due to the conversion of the starch of the seed into maltose through the action of the diastase. Malt floats on cold water.

Habitat: Grown throughout the world wherever the climate is favorable.

Discussion: The process known as "*malting*" has for its object the development of the maximum amount of diastase, the ferment which converts the starch of the grain into maltose. In order to accomplish this most efficiently, the following steps are taken: The grain is first "*steeped*," i.e., soaked in water for one or two days during which it absorbs about its own weight of water. It is then "*couched*," i.e., spread out in layers 6 inches deep and allowed to germinate whereby some heat is developed. After the germination has proceeded until the shoots have attained about one-third the length of the grain, it is "*floored*," i.e., spread out upon the floor to dry or dried by artificial heat. It is then "*kiln-dried*," i.e., exposed to a temperature that will complete the drying process and arrest germination.

Malt is designated commercially by various terms referring to its color which, in turn, is dependent upon the degree of heat used in kiln-drying, e.g., "*amber malt*," "*black malt*," etc. If the malt is to be employed in the manufacture of beer, ale, stout, porter or whisky, it is then placed in a large vat of water and subjected to the action of a yeast, i.e., a ferment which acts upon the sugar (maltose) that has been formed by the action of the diastase, converting it into alcohol. Along with the diastase another ferment or enzyme is formed during the malting process. This is *peptase* which, in the after-mash process, changes the proteins of the malt into peptones and thus gives to the liquor its nutritive value. While most of the malt used in this country is manufactured at home, 765,291 pounds were imported in 1924.

CONSTITUENTS: Malt, properly made, contains diastase 1 to 2 per cent; maltose, 48 to 70 per cent; proteins, 8 per cent; dextrin, 2 to 16 per cent; a trace of phosphoric and lactic acids.

PROPERTIES AND USES: The extract of malt is a heavy, brownish, sweet, pleasant-tasting nutrient and is used as an easily assimilated food. It may also be employed as an emulsifying agent for cod-liver or other oils. The dry extract is sometimes used as a food for infants.

OFFICIAL PREPARATION: U.S.P. X.

Extract of Malt, 4 dr. (15 Gm.).

SUCROSUM

(sū-krō′sŭm)

SUCROSE—U.S.P.

SYNONYMS: Saccharum (U.S.P. IX); Sugar; Cane Sugar; Beet Sugar; Refined Sugar; Saccharum Purificatum.

SOURCE: Saccharum officinarum Linné (Fam. Gramineæ) and other sources. Note: While the sugar beet (Beta vulgaris Linné, var. Rapa, Dumont (Fam. Chenopodiaceæ) is not specifically mentioned by the U.S.P. X as a source of sugar, it supplies a very considerable proportion of the amount used in this country.

ETYMOLOGY: Sucrosum and sucrose from the Fr. "sucre," *sugar.*

Saccharum from the Lat. "saccharon," *sugar.*

Sugar from the Arab. "sukkar," from the Skt. "carkara," *candied sugar,* originally *grit* or *gravel.*

Officinarum from the Lat. "officina," *a work shop,* probably from "opificium," from "opus," *work,* and "facere," *to make.*

Beta the Lat. for beet, from the Cel. "bett," *red,* referring to the color of the root.

Vulgaris the Lat. for common or usual, from "vulgus," *the common people, the multitude.*

Rapa from the Lat. "rapum," *a turnip.*

DESCRIPTION AND PHYSICAL PROPERTIES: White, hard, dry crystals or blocks, or a white, crystalline powder. It is odorless, has a sweet taste, and is stable in the air.

One Gm. of Sucrose is soluble in 0.5 cc. of water and in 170 cc. of alcohol, at 25° C. One Gm. is soluble in slightly more than 0.2 cc. of boiling water. It is insoluble in chloroform and in ether.

HABITAT: The sugar cane is cultivated in many tropical and subtropical countries where moisture and soil conditions are favorable. The sugar beet is grown in France, Germany and the United States.

DISCUSSION: The sugar cane is a perennial, herbaceous plant resembling more or less our common Indian corn. It is propagated by laying the young, tender shoots, called "*cuttings,*" in furrows and covering them with earth, whereupon sprouts appear at the nodes and develop into new plants. The cane is harvested by cutting the ripe stems and stripping off the leaves. These stems are hauled to the sugar mill where they are run through heavy iron rollers to express the juice. This juice is run into large shallow copper pans and boiled with lime (1 to 800) to neutralize the organic acids present. Unless neutralized, these acids would change the sucrose to invert sugar. During the boiling process with lime, any free albumen contained in the juice is coagulated. This comes to the top in the form of a scum, whereupon it is removed by occasional skimming. The boiling is continued until the juice is sufficiently concentrated to crystallize out when cooled. At this point it is run off into crystallizing pans called "*coolers,*" where it is stirred during the crystallizing process to prevent caking. It is then run into centrifuges running at high speed which rapidly separate the molasses from the sugar. This molasses is concentrated in vacuum stills and a second crop of crystals of sugar obtained as in the first case. This is continued until the resulting sugar is quite brown in color and crystallizes so difficultly as not to warrant further attempts at recovery. The residual almost black and rather ill-smelling molasses is stored in mammoth tanks and later utilized in the manufacture of ethyl alcohol. Most of the "grain" alcohol now in use comes from this source.

Cane sugar was first introduced into Europe by the Venetians who brought it from India during the crusades. Its original use was exclusively as a medicine. With the discovery of the sea route to India around the Cape of Good Hope, the commercial control of sugar passed into the hands of the Portuguese. Its demand thus stimulated, its cultivation extended into Egypt, Arabia, Spain, Sicily, the Canary Islands, America and the West Indies.

The sugar beet is a biennial herb with a fleshy root, either purple or yellowish white and is so nearly like the common garden beet as to make any extended description of it here unnecessary. Notwithstanding the enormous production of sugar in this country, the statistics of the Department of Foreign Commerce and Navigation show that during the year, 1924, there were imported into the United States 118,271,607,070 pounds of cane sugar and 4,139,407 pounds of beet sugar.

CONSTITUENTS: Sugar cane yields about 80 per cent of juice which contains from 16 to 21 per cent of sugar. The sugar beet yields from 10 to 16 per cent of sugar.

PROPERTIES AND USES: Sugar is demulcent in cough, hoarseness and irritated mucous surfaces. The various syrups are largely employed as vehicles and adjuvants in prescription practice. Sugar is used in certain preparations, such as the iron compounds, to prevent oxidation and in others as an antiseptic or preservative and to cover the taste of disagreeable drugs.

OFFICIAL PREPARATIONS: U.S.P. X and N.F. V.

Sugar is used merely as a sweetening, protective or preservative agent, or as a diluent, in so many products that an enumeration of them is not necessary.

CHAPTER XI

ZINGIBERACEÆ

(zĭn′gĭ-bĕr′ā′sē̇-ē)

GINGER FAMILY

THESE are perennial, herbaceous plants, indigenous for the most part, to the tropics of the eastern hemisphere, only two of the genera being found in tropical America. They have fleshy roots or tuberous rhizomes. The leaves are lanceolate, their sheaths closing around each other to form a sort of false stem. Many of them contain volatile oil which has a yellowish color due to curcumin in solution. Microscopically the starch grains are characteristic, having a sort of beak near the point of origin of growth. There are 24 genera and 275 species.

ZINGIBER

(zĭn′gĭ-bĕr)

GINGER—U.S.P.

SYNONYMS: Jamaica Ginger; African Ginger; Cochin Ginger.

SOURCE: Zingiber officinale Roscoe (Fam. Zingiberaceæ).

ETYMOLOGY: Zingiber from the Gr. "ziggiberis" which in turn came from the Arabic "zindschebil," meaning *root of "zindschi" (India)*. The Arabic term probably came from the Sanskrit "gringa," *horn*, and "vera" *body*, i.e., the roots are horn-shaped.

Officinale from the Lat. "officina," *a work shop* or *store*, from "opus," *work*, and "facere" *to do*, referring to the fact that it is kept for sale in the store.

PART USED: The dried rhizome.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Jamaica Ginger:* Rhizome horizontal, laterally compressed, irregularly branched, from 4 to 16 cm. in length and from 4 to 20 mm. in thickness; the cork wholly removed; externally light brown, longitudinally striate, ends of the branches with depressed stem-scars; fracture short, fibrous, starchy and resinous; internally yellowish to light brown; odor agreeably aromatic; taste aromatic and pungent.

Unground Cochin Ginger: Cork almost or wholly removed on the flattened sides light brown to grayish yellow, fracture shorter, less fibrous and more starchy than other varieties; internally yellowish-white; oil and resin cells vary from yellowish to brownish red; odor aromatic, taste pungent.

Unground African Ginger: Cork partly removed on the flattened sides, leaving light brownish areas; portions with cork, longitudinally or reticulately wrinkled and grayish brown; internally light yellow to brown; taste aromatic and strongly pungent; otherwise resembling Jamaica Ginger.

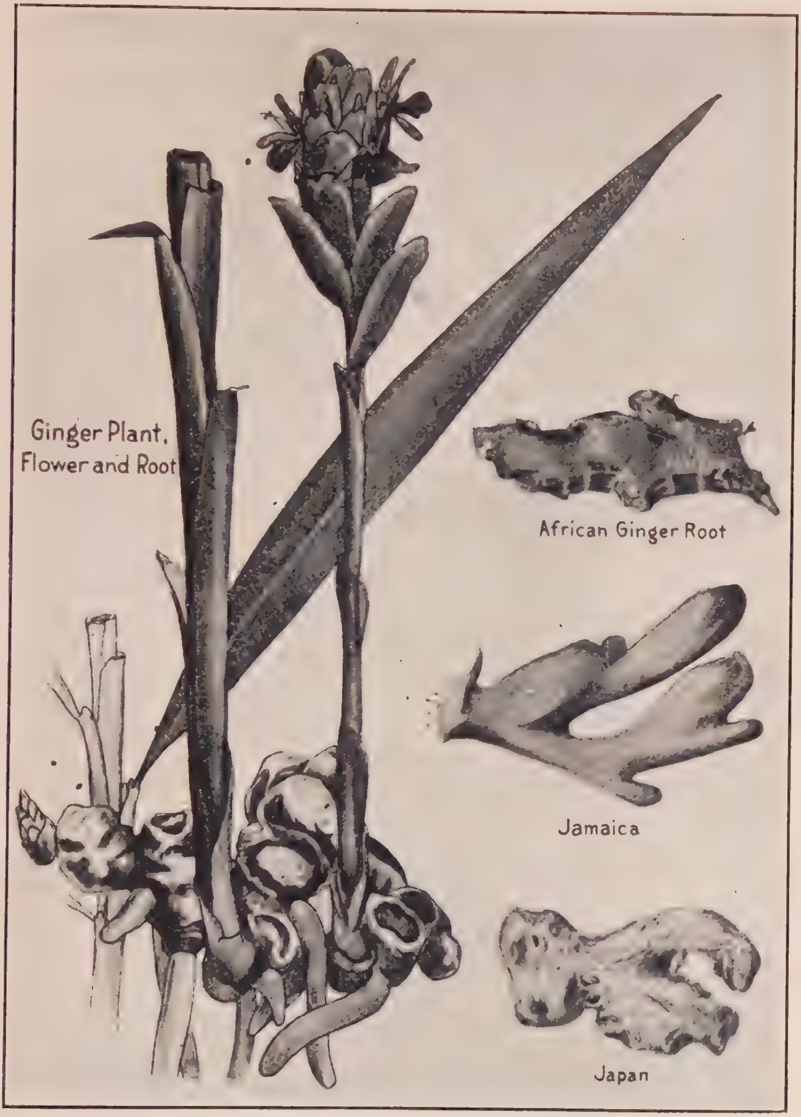

FIG. 13.—Ginger. (Courtesy of McCormick & Company.)

HABITAT: India. Cultivated in Africa and the West Indies.

DISCUSSION: Ginger was known to the Greeks and Romans as early as the first century of the Christian Era, having been introduced into Europe from Asia through Arabia. The Greek and Arabian physicians used it as a condiment, stimulant and aphrodisiac.

Ginger is a biennial or perennial plant with an annual stem growing about 3 feet in height. The leaves are alternate, about 5 or 6 inches long by an inch in breadth. The flower stalk rises by the side of the stem some 6 to 12 inches in height. The flower stalk is leafless and terminates in an oval spike upon which several dingy, yellowish flowers of aromatic odor appear at a time.

The rhizome is dug when the stems of the plant have withered, the aim being to collect it before it becomes fibrous. Since it is possessed of great vitality, it is scalded with boiling water to prevent germination. This often gelatinizes the starch and causes the rhizome to appear diaphanous and horny. If dried in the sun, it is white and mealy. This is the characteristic of the so-called *white* or *Jamaica ginger*, which is produced by carefully pealing the fresh rhizome so that only the epidermis is removed. These peeled pieces are then macerated in water or in milk of lime before drying and are usually dusted with calcium carbonate. The importation of ginger for 1924 was 5,062,832 pounds.

CONSTITUENTS: Volatile oil (mostly phellandrene and dextro-camphene, $C_{10}H_{16}$), 1 to 3 per cent; gingerol, a straw-colored, viscid, inodorous, non-volatile, pungent liquid, imparting a hot taste; resin; starch, 20 per cent.

PROPERTIES AND USES: Ginger is used very largely in domestic medicine as a carminative and stomachic tonic; also as an astringent in diarrhea. It is a valuable and pleasant corrective to nauseous or griping medicines. It has found much favor in the treatment of menstrual cramps, particularly when they result from suppression of the function as a result of exposure to cold.

DOSE: 8 gr. (0.5 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Fluidextract of Ginger, 8 m. (0.5 cc.).
Compound Rhubarb Powder, 30 gr. (2 Gm.).
Syrup of Ginger, 2½ fl. dr. (10 cc.).
Tincture of Ginger, 30 m. (2 cc.).

(*a*) CARDAMOMI SEMEN

(kär′dā-mō′mī sē′mĕn)

CARDAMOM SEED—U.S.P.

(*b*) OLEUM CARDAMOMI

(ō′lē̇-ŭm kär′dā-mō′mī)

OIL OF CARDAMOM—N.F.

SYNONYMS: (*a*) Malabar Cardamom; Ceylon Cardamom; Cardamom Fruit.

SOURCE: Elettaria Cardamomum Maton (Fam. Zingiberaceæ).

ETYMOLOGY: Cardamomum from the Gr. "kardia," *heart*, and "amomos," *a spice*, because of its use in cardialgia (heartburn).

Elettaria is the Lat. form of "elettari," the native Malabarese name of the plant.

Semen (pl. semina), the Lat. for *seed*, from "serere, satum," *to sow, to scatter seed.*

PART USED: (*a*) The dried ripe seeds recently removed from the capsules.

(*b*) The volatile oil distilled from the seeds.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) *Unground Cardamom Seed:* Mostly agglutinated into groups of 2 to 7 by the adhering membranous aril, the individual seeds oblong-ovoid or irregularly 3- to 4-sided, from 3 to 4 mm. in length; convex on the dorsal surface, strongly longitudinally grooved on the ventral side and coarsely tuberculated; externally reddish-gray brown; odor aromatic; taste aromatic and pungent.

(*b*) Oil of Cardamom is a colorless or very pale-yellow liquid having the characteristic aromatic, penetrating and somewhat camphoraceous odor of cardamom, and a persistent, pungent and strongly aromatic taste.

It is very soluble in alcohol and readily soluble in four volumes of 70 per cent alcohol, forming a clear solution.

HABITAT: Malabar. Cultivated in India and Ceylon.

DISCUSSION: This plant grows abundantly in the Malabar district where it springs up spontaneously in the forests after the removal of the underbrush, and is very extensively cultivated by the natives. It is perennial and has from 10 to 20 erect, shining, green stems arising from the tuberous root or rhizome. These stems are from 6 to 12 feet in height and bear alternate, sheathing leaves from 1 to 2 feet in length and 3 to 5 inches in breadth.

The flower stalk arises from the base of the stem and lies flat upon the ground. The flowers are arranged in a panicle. The fruits are papery, trilocular capsules containing many seeds and are known commercially as "shorts," "short longs" and "longs," according to their size and shape.

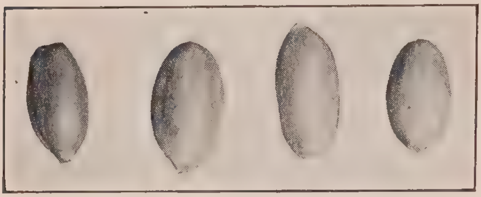

Fig. 14.—Cardamom fruit.

The plant begins to bear fruit when it is four years old and continues productive for a number of years. The capsules, upon ripening, are picked and dried, either in the sun or by a gentle fire. They are then washed in earthenware vessels containing a mixture of soapnut and a species of acacia, one part, to eight parts of water. The water must be obtained from only certain wells. Two women stir the mixture rapidly for about one minute; then rest for an equal length of time; then stir once more. This completes the first washing. The fruits are then skimmed out of the thick, soapy lather with the hands and placed in a basket to drain, after which they receive a second washing similar to the first, except that a portion of the soapnut preparation is replaced by a soap solution. The fruits are then placed upon a mat and sprinkled with water from the same special wells every half hour until the following morning when they are spread out upon the roof of a house and allowed to dry for a half day. The women then take large scissors and snip off the fruit stems, after which the cardamoms are sorted. Only the best and plumpest fruits are sent to the foreign markets. This procedure in washing and drying the cardamom fruits is performed with the greatest exactness, prompted no doubt, by a fanatical, superstitious zeal. 118,903 pounds of cardamom fruits were imported in 1924.

Constituents: (*a*) Volatile oil, 4 to 6 per cent; fixed oil, 10 per cent; formic and acetic acids.

Properties and Uses: Cardamom is used as a stimulating and carminative adjuvant or corrective for various tonic and purgative remedies, and as an agreeable flavor in pharmaceutical preparations. It is also stomachic and condiment.

Dose: (*a*) 15 gr. (1 Gm.).

Official Preparations: U.S.P. X.

(*a*) Cardamom seed:

Tincture of Cardamom, 30 m. (2 cc.).
Compound Tincture of Cardamom, 1 fl. dr. (4 cc.).
Compound Tincture of Gentian, 1 fl. dr. (4 cc.).
Tincture of Rhubarb, 1 fl. dr. (4 cc.).

N.F. V.

(*b*) Oil of Cardamom:
Compound Spirit of Cardamom.
Compound Elixir of Cardamom.
Aqueous Elixir of Glycyrrhiza, 2 fl. dr. (8 cc.).

ZEDOARIA

(zĕd′ō̇-ā̇-rĭ′ȧ)

ZEDOARY—N.F.

Source: Curcuma Zedoaria (Berguis) Roscoe (Fam. Zingiberaceæ).

Etymology: Zedoaria and Zedoary from the Arabic and Persian "zedwar," the name of the plant.

Curcuma from the Arabic "kurkum," the name of a group of plants.

Part Used: The dried rhizome.

Description and Physical Properties: *Unground Zedoary:* Usually cut into transverse rounded sections, twisted and wrinkled, from 1 to 4 cm. in diameter, and from 5 to 10 mm. in thickness; externally grayish brown, hairy, rough, with few root scars; transverse surface pale reddish, to gray brown; a distinct dark circular endodermis separates the cortex from the central cylinder; the stele contains numer-

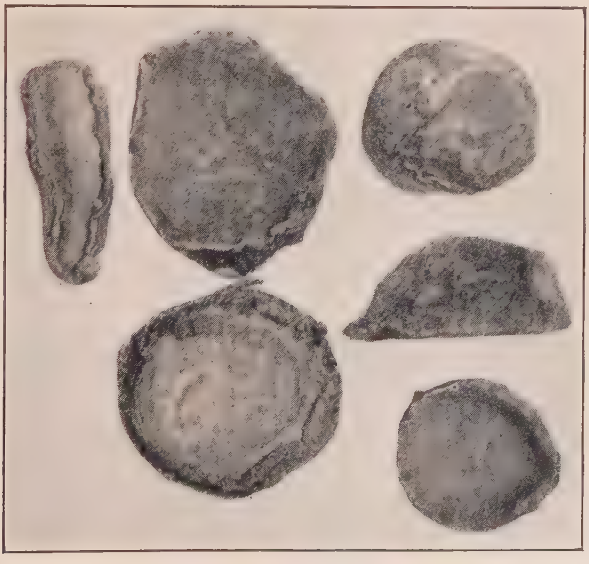

Fig. 15.—Zedoary.

ous, orange-colored resin cells, and irregularly distributed lighter colored fibrovascular bundles which are fewer in the cortex; fracture short, somewhat mealy and waxy. Odor aromatic, camphor-like; taste aromatic, warm, slightly bitter.

Habitat: India. Cultivated in China, Madagascar, Ceylon and Madras.

Discussion: This is a perennial, herbaceous plant closely related to curcuma. The rhizome (more properly, tuber) varies in size from $\frac{1}{2}$ to $1\frac{1}{2}$ inches in length and nearly the same in diameter. The rhizome is dug, washed and sliced to facilitate drying. That reaching the United States comes from Ceylon and India. It appears in the market in the form of nearly circular disks from $\frac{1}{6}$ to $\frac{1}{2}$ inch in thickness. It has an aromatic odor and a warm, ginger-like taste.

Constituents: Volatile oil, 0.5 to 1 per cent; resin, 0.5 per cent; fixed oil.

Properties and Uses: The action and uses of zedoaria are very similar but inferior to those of ginger. It is much used as a spice in some of the eastern countries.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Antiperiodic Pills, 1 pill.
Antiperiodic Pills without Aloe, 1 pill.
Antiperiodic Tincture, 1 fl. dr. (4 cc.).
Antiperiodic Tincture without Aloe, 1 fl. dr. (4 cc.).
Bitter Tincture, 30 m. (2 cc.).

GALANGA

(gȧ-lăn′-gȧ)

GALANGAL—N.F.

Synonyms: China-root; Chinese Ginger.

Source: Alpinia officinarum Hance (Fam. Zingiberaceæ).

Etymology: Galanga from the Arabic "khalanjan," the name of the plant. Alpina, named for Prospero Alpin, an Italian botanist.

Part Used: The dried rhizome.

Description and Physical Properties: *Unground Galangal:* Irregularly branched, from 2 to 10 cm. long and from 1 to 2 cm. thick, the branches thinner toward the base; marked with the fine annuli of the leaf bases, which are from 3 to 10 mm. apart and of lighter color than the general surface; externally reddish or rusty brown; internally of a lighter orange brown; cut ends of the branches circular and expanded; fracture fibrous. Odor aromatic and agreeable; taste hot, spicy, resembling ginger.

HABITAT: Eastern and Southeastern Asia.

DISCUSSION: Galangal is a perennial, flag-like herb growing about 2 feet in height. The flowers are white with red veins and occur in terminal racemes. The rhizome is collected from plants from four to ten years old. It is cut into sections from 2 to 3 inches in length and carefully dried. As seen in the market, the rhizomes are reddish-brown externally and show circular scars of bud scales. The odor and taste are agreeably aromatic and remind one of ginger. The powdered drug presents a rust-brown color, but otherwise resembles powdered ginger.

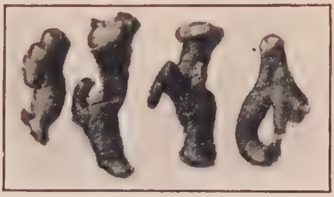

FIG. 16.—Galangal.

CONSTITUENTS: Volatile oil, 0.5 to 1 per cent; a soft, acrid resin; fixed oil; starch; kaempferid; galangin; alpinin.

PROPERTIES AND USES: Galangal is stimulant, aromatic and carminative, resembling ginger in both its action and uses.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATION: N.F. V.

Aromatic Tincture, 30 m. (2 cc.).

CHAPTER XII

ORCHIDACEÆ

(ôr′kĭ-dā′sė̄-ē)

ORCHID FAMILY

This family, consisting of 12,000 or more species, is one of the most interesting in the plant kingdom. They occur for the most part in the tropics. They are classified according to their habits of growth as "*saprophytic*," "*epiphytic*" or "*terrestrial*," the epiphytic predominating in the tropics. They are remarkable for the beauty and delicacy of their flowers which often bring very high prices in the social centers of the world.

CYPRIPEDIUM

(sĭ′prĭ-pēd′ĭ-ŭm)

CYPRIPEDIUM—N.F.

Synonyms: Lady Slipper; Yellow Moccasin Flower; Venus' Shoe; Yellow Indian Shoe; Yellow Noah's Ark; American Valerian.

Source: Cypripedium bulbosum Miller, Cypripedium pubescens Willdenow and Cypripedium parviflorum Salisbury (Fam. Orchidaceæ).

Etymology: Cypripedium from the Lat. "Cypris," *Venus*, and "pes, pedis," *foot*, or from the Gr. "Kypris," *Venus*, and "pous, podis," *foot* (podion, *slipper*), because the flower has a slipper-like shape.

Pubescens from the Lat. "pubescens, -centis," from "pubescere," *to reach puberty*, literally, *to grow hair*, i.e., covered with hairs.

Hirsutum from the Lat. "hirsutus," *rough with hair*, i.e., pubescent with rather coarse, stiff hairs.

Parviflorum from the Lat. "parvus," *small*, and "florus," *flower*, referring to the flowers which are smaller than in other species.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Cypripedium:* Rhizome of horizontal growth, curved, 3 to 10 cm. long, 2 to 6 mm. thick, orange brown to dark brown, the upper side showing numerous circular, cup-shaped scars, closely covered below with simple, wiry roots, the latter varying from 3 to 15 cm. in length; fracture of rhizome short, white; that of roots somewhat fibrous. Odor distinct, heavy; taste sweetish, bitter and somewhat pungent.

Habitat: In the eastern portion of Canada and the United States from Nova Scotia to Alabama and westward as far as Nebraska and Missouri.

Discussion: This plant inhabits the dark, shady woodlands and swampy places of the above-stated regions. It grows from 1 to 2 feet in height, bearing a solitary, yellow flower at the top of the stem. The fruit is an oblong capsule tapering at each end. The rhizome is collected shortly after flowering. It is then washed, dried in the sun and packed for the market.

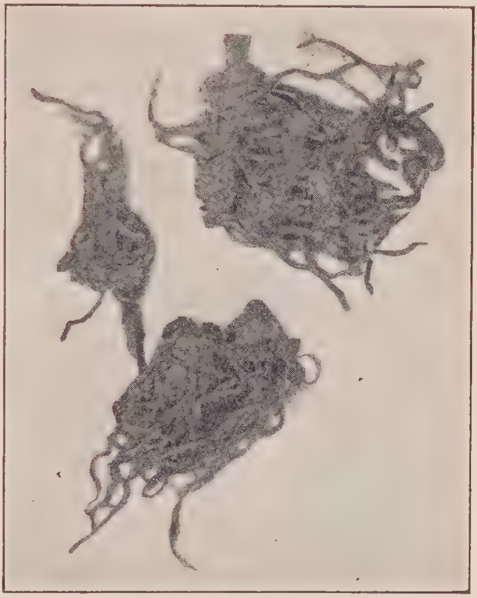

Fig. 17.—Cypripedium.

Constituents: Cypripedin; volatile oil; resin. The Eclectics prepare a substance they call "*cypripedin*" by precipitating a concentrated alcoholic tincture of the drug by pouring it into water, filtering and drying the precipitate.

Properties and Uses: Cypripedium has been used as a nerve stimulant in various forms of nervousness such as hypochondriasis, neuralgia and insomnia, and as an antispasmodic for chorea, hysteria and epilepsy. It does not appear to possess much medicinal value.

Dose: 15 gr. (1 Gm.).

Official Preparation: N.F. V.

Fluidextract of Cypripedium, 15 m. (1 cc.).

VANILLA

(vȧ-nĭl′ȧ)

VANILLA—N.F.

Synonyms: Vanilla Bean or Fruits; Vanilla Aromatica.

Source: Vanilla planifolia Andrews (Fam. Orchidaceæ).

Etymology: Vanilla from the Sp. "vaina," *a scabbard, pod* or *sheath*, and "illa," *small*, i.e., a little pod.

Planifolia from the Lat. "planus," *flat*, and "folium," *leaf*, i.e., the leaves are without prominent veins.

Part Used: The cured, full-grown, but immature fruits.

Description and Physical Properties: *Unground Vanilla:* Fruit linear, flattened, from 12 to 35 cm. in length and from 5 to 9 mm. in width; apex terminating in a flat, circular scar; gradually tapering, more or less bent and curved or hooked at the base, or in the Tahiti variety, broad in the middle and tapering towards either end, the base closely resembling the summit; externally blackish brown, longitudinally wrinkled, moist-glossy; occasionally with an efflorescence of vanillin in the form of acicular crystals or monoclinic prisms; frequently with narrow, elliptical or irregular, more or less wrinkled, dark brown patches of cork, occasionally split into three parts near the tip, flexible and tough, one-celled, containing a blackish-brown pulp and numerous blackish-brown seeds; the latter being flattened, irregularly triangulate or nearly circular in outline; reticulate and varying from 0.25 to 0.3 mm. in diameter. Odor and taste characteristic and very agreeable.

Habitat: Eastern Mexico, West Indies tropical portions of South America.

Discussion: This is a perennial climbing vine, requiring a moist, hot climate, but with a dry spell during the flowering season. It has a fleshy, dark-green stem which is much branched and furnished at the nodes with aerial roots which cling to the trees or other supports. Trellises are frequently employed for the plants to climb upon where the vanilla is cultivated. The plants are propagated by means of cuttings. These are from 2 to 10 feet in length and should be taken from the growing shoots. These cuttings are placed under the trees and trellises upon which the vines are to climb with one end on the ground, this being covered with leaves or a light top-dressing. The vines begin to bear the third year.

Since the flowers do not fertilize themselves (except in Mexico) and no nectar is present to attract bees or other insects, pollenization by hand is necessary. This is done by the women and children who transfer the pollen from the stamens to the pistil by means of a small stick similar to a toothpick. It is stated that a fairly skilled laborer can fecundate, in this manner, about one hundred flowers per hour. In most localities not over thirty fertilized flowers should be left on a plant since that is about the limit that one plant can mature.

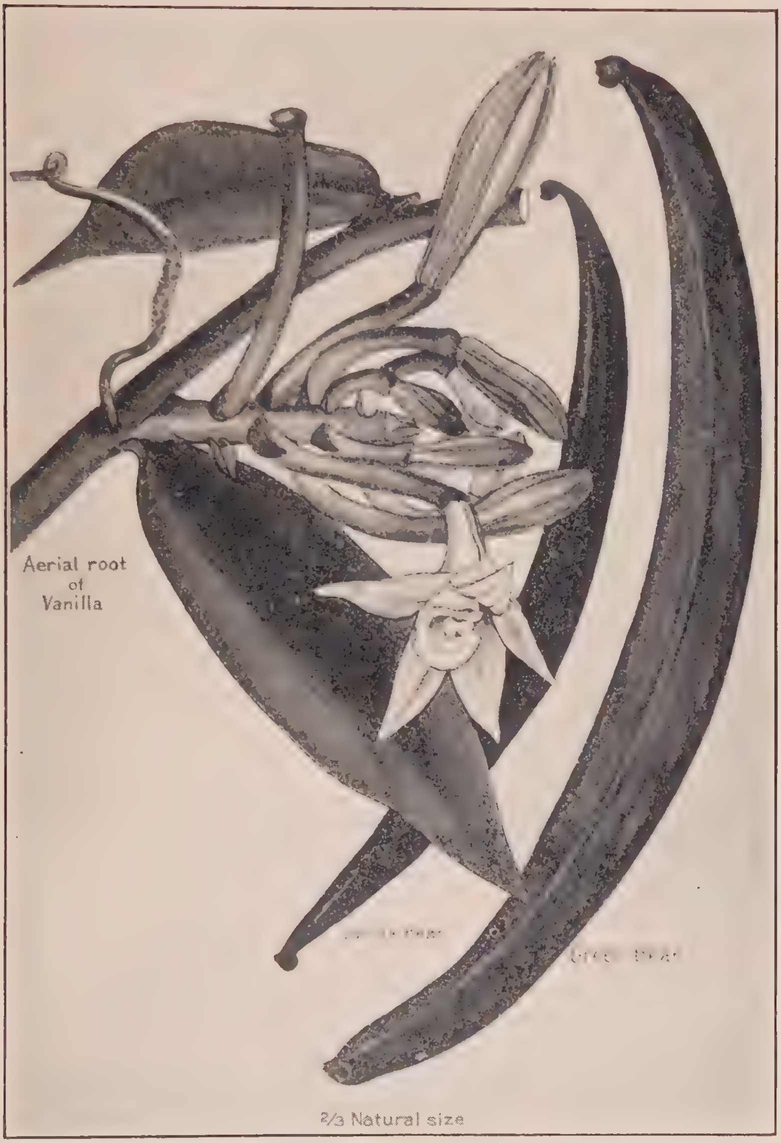

FIG. 18.—Vanilla stem, flowers and fruits. (Courtesy of McCormick & Company.)

The vanilla pods reach their full size in a growing season of from five weeks to eight months, depending on the altitude and the amount of shade and moisture present. The pods are picked when they begin to ripen, which is shown by their turning from green to yellow. They are then sorted into grades according to their size and form, and subjected to the curing process. The curing is done by first placing them in a room heated to about 110° F. and allowing them to remain in this temperature for some time. Then they are transferred to a room of about 90° F. and after remaining there for the proper length of time, the process is finished at ordinary temperature. The whole process requires several months, during which time the pods lose from 70 to 80 per cent of their weight from evaporation.

The old process of curing the beans by placing them under blankets in the sun is still in use in some localities, but that just described is more certain of yielding satisfactory results. After the curing is completed, the pods are tied in bundles and wrapped in lead sheets or packed in tin cans.

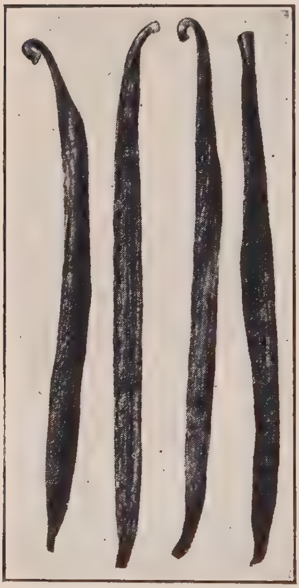

Fig. 19.—Vanilla beans.

At the time of collection, vanilla beans contain little or no vanillin. This substance, known chemically as *methyl protocatechuic aldehyde*, is developed during the sweating, curing or fermentation process and is believed to be due to enzymic action upon a glucoside, probably coniferin, and subsequent oxidation of the product of decomposition, into vanillin.

There are several commercial varieties of vanilla:

(1) The *Mexican* or *Vera Cruz* which is the best grade on the market.

(2) The *Bourbon*, from the Isle of Reunion. It resembles the Mexican variety in some respects, but the pods are blacker and the tapering portion shorter. These soon become coated with acicular crystals of vanillin which sublimes upon the surface. Their odor resembles the tonka bean.

(3) The *Mauritius*. These are an inferior Bourbon grade from the island of the same name (about 600 miles east of Madagascar) and the Seychelles, an island about 800 miles northeast of Madagascar.

(4) The *Venezuelan*. These have long, thick pods and an odor very like the tonka bean.

(5) The *Brazilian*. These have an inferior vanilla odor. The

importation of vanilla during the year, 1924, amounted to 809,135 pounds valued at $4,404,534.

Constituents: Vanillin, $C_8H_8O_3$ or $C_6H_3CHO \cdot OCH_3OH$, about 2 per cent; an odorous, possibly balsamic, resin; fixed oil, 10 per cent; sugar, 10 per cent. While vanillin represents, essentially, the flavoring property and value of vanilla, associated constituents undoubtedly play an important part in producing the delightful flavor of vanilla.

Vanillin is made synthetically on a large commercial scale. The methods vary with the materials used. It is made from coniferin, which is converted into coniferyl alcohol and this into vanillin. It is prepared from eugenol, a constituent of clove, allspice, bay and other oils; also from isoeugenol and from protocatechuic aldehyde.

Properties and Uses: Persons whose work brings them constantly in contact with vanilla, develop a severe itching of exposed portions of the body, especially the hands and face, where the skin breaks out with a sort of pruriginous eruption. Dizziness and exhaustive muscular pains are also common. Although recommended for hysteria and other forms of nervous excitement, about the only practical use made of vanilla at the present time is as a flavoring for cakes, ice cream, ices, confections and chocolate.

Official Preparation: N.F. V.

Tincture of Vanilla.

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CHAPTER XIII

DICOTYLEDONS

In the plants of this group the seeds have two cotyledons as seen in the peanut and the bean, therefore two embryonic leaves occur at the first node. The leaves are reticulately veined and usually have an irregular margin, sometimes being deeply lobed. The plants are remarkable for the variety of their forms and modifications. The stem is composed of a pith enclosed in wood, a cambium zone by which lateral growth takes place, and a true bark. This class contains about 175 families, nearly one half of which supply medicinal drugs.

FAGACEÆ

(fȧ-gā′sė̆-ē)

BEECH FAMILY

This is an important family of trees and shrubs. It contains 5 genera and about 400 species, the three most important genera being *Quercus*, the oak; *Fagus*, the beech; and *Castanea*, the chestnut. However, it is of little importance, since reclassification is continually going on. The family, Fagaceæ, includes much of the valuable timber of Europe and America.

QUERCUS

(kwûr′kŭs)

WHITE OAK—N.F.

SYNONYMS: Stone Oak; Tanner's Oak; Quercus Alba.

SOURCE: Quercus alba Linné (Fam. Fagaceæ).

ETYMOLOGY: Quercus from the Celtic "quer," *handsome*, and "cuez," *tree*, referring to the appearance of the tree.

Alba the Lat. for *white*, referring to the whitish appearance of the bark.

PART USED: The dried inner bark collected from the trunk and branches.

Description and Physical Properties: *Unground Quercus:* In nearly flat pieces, from 2 to 10 mm. in thickness; externally light brown, becoming darker with age, rough-fibrous; fracture uneven, coarsely fibrous. Odor distinct; taste strongly astringent; not tingeing the saliva yellow when chewed.

Habitat: Canada and the eastern portion of the United States.

Discussion: This is one of the largest, as well as most beautiful, of our forest trees. When growing in the thick woods, it attains a remarkable height, but when growing in open spaces, it becomes much branched and affords a dense shade. Of all the many species of American oaks this is the most highly valued for its timber. All parts of the tree are astringent, but only the inner bark, as noted above, is recognized by the National Formulary.

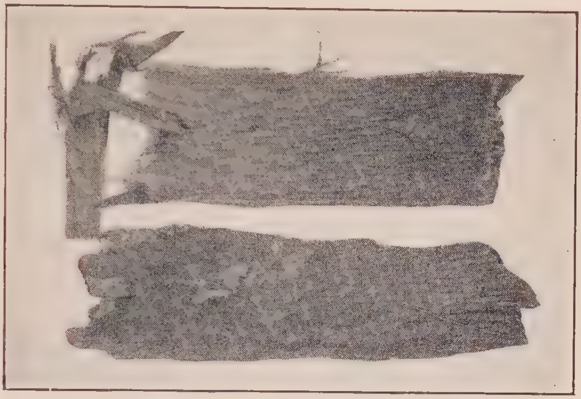


Fig. 20.—White oak bark.

Constituents: Quercitannic acid, 5 to 12 per cent; quercin; oak-red.

Properties and Uses: Oak bark is astringent and may be used in the form of an infusion as an astringent injection or where an astringent action is desired. Years ago great quantities of oak bark were used as a tanning agent in the manufacture of leather.

Dose: 15 gr. (1 Gm.).

Official Preparation: N.F. V.

Fluidextract of Quercus, 15 m. (1 cc.).

GALLA

(găl′à)

NUTGALL—U.S.P.

Synonyms: Aleppo Galls; Smyrna Galls; Turkey Galls; Mecca Galls; Mad Apple; Dead Sea Apple; Apple of Sodom; Dyer's Oak.

Source: Quercus infectoria Olivier, and other allied species of Quercus (Fam. Fagaceæ).

ETYMOLOGY: Galla, the Lat. for *gall, excresence,* or *growth.*

Infectoria from the Lat. "infectus," from "inficere," *to dip into, to stain* or *taint,* i.e., *to become infected.*

Quercus from the Celtic "quer," *handsome,* and "cuez," *tree,* referring to the appearance of certain members of the genus.

PART USED: The gall from the young twigs.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Nutgall:* Nearly globular, from 0.8 to 2.5 cm. in diameter, heavy, mostly sinking in water; externally dark olive green to dark grayish, tuberculated on upper portion; basal portion smooth and contracted into a short stalk; fracture short, horny; internally grayish to dark brown, with a central slightly radiate portion; occasionally with a central cavity connected by a narrow, radial canal to the external surface; odor slight; taste strongly and persistently astringent.

HABITAT: Syria, Turkey, Persia, Asia Minor.

DISCUSSION: A gall is a growth or excresence on a plant, caused by the sting of an insect, usually for the purpose of depositing its eggs where they will hatch. Certain insects, known as "*gall mites,*" "*gall gnats*" or "*gall wasps,*" cause these excresences which, by their various forms, are known as "*felt galls,*" "*mantle galls*" or "*solid galls.*"

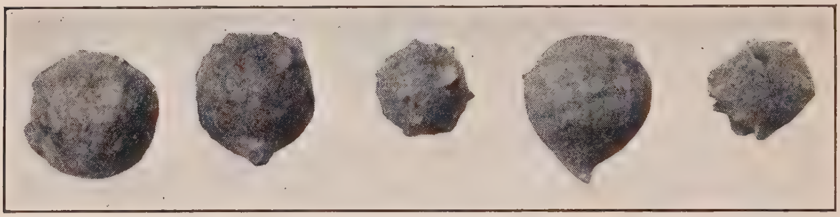


FIG. 21.—Nutgalls.

The galls in question are formed on Quercus infectoria, a shrub or small tree seldom attaining more than 6 feet in height. The insect that causes the excresence to form is the female fly, Cynips tinctoria, which stings the young leafbuds, or tender bark of the twigs, for the purpose of depositing its eggs. This wound sets up an irritation, the plant juices flow to the part more freely because of the irritation and a pathological tissue or formation results. The new tissue forms about the egg, gradually lifting it beyond the normal surface of the part. The egg continues its development within this tumor or gall and hatches into the larva which then feeds upon the walls of the chamber confining it. That portion of the wall immediately surrounding the larva is known as the "*pith*" and is composed of a starchy, nutritious substance which is replenished as fast as it is consumed by the larva. Outside this pith is a protecting layer composed of stone cells. When the growing larva has developed into a fly, it bores its way out through the side of the gall and escapes. For some reason the galls are thought to be better if they are collected before the insect has escaped. On opening a number of the galls, one will find that a portion of them still contain the remains of the insect within its spherical chamber, since they do not seem to be able to bore their way out after the galls have been picked. 1,813,559 pounds of nutgall were imported in 1924.

Constituents: Gallotannic (tannic or digallic) acid, 50 to 60 per cent; gallic acid. It is interesting to note that the tannin of galls has different physical and chemical properties from that of the plant upon which they grow.

Properties and Uses: Nutgall, on account of the tannic acid present, is astringent and styptic. It is employed in the form of its liquid preparations as an astringent in chronic diarrhea, dysentery, leucorrhœa and gleet. It is a valuable antidote in poisoning by tartar emetic and alkaloids because of the insoluble nature of the compounds it forms with them. In such cases it not only forms a slowly soluble compound with the poisons themselves, but by constringing the walls of the stomach, delays their subsequent absorption. As an antidote, an infusion of the drug may be administered freely. The infusion is also serviceable as a gargle in relaxed conditions of the mucous membrane of the mouth and throat. Nutgall is styptic and may be used to check secretions and hemorrhages and to allay local inflammation. Its chief commercial use is as a source of tannic and gallic acids and in the manufacture of ink and leather; also as a mordant in the dyeing industry.

Dose: 8 gr. (0.5 Gm.).

Official Preparation: U.S.P. X.

Nutgall ointment.

CASTANEA

(kăs-tā′nē-ȧ)

CASTANEA—N.F.

Synonym: Chestnut Leaves.

Source: Castanea dentata (Marshall) Borkhausen (Fam. Fagaceæ).

Etymology: Castanea, the Lat. for "*chestnut,*" from the Gr. "kastanon," *the chestnut.*

Dentata from the Lat. "dens, dentis," *tooth,* i.e., the leaves have dentate or toothed margins.

Part Used: The dried leaves.

Description and Physical Properties: *Unground Castanea:* Blade entire or slightly broken and usually folded or matted together; about 15 to 25 cm. long and about 5 cm. wide, oblong-lanceolate, apex attenuate, acute at the base, coarsely and sharply serrate with ascending, attenuate teeth, nearly smooth, coriaceous in texture, the upper surface dark green, the lower light green; distinctly pinnately veined, the veins of the first order diverging at an angle of about 60 degrees, each terminating in one of the teeth; petiole stout, about 12 mm. long. Odor slight; taste astringent.

Habitat: Eastern United States, Southern Europe, Western Asia.

Discussion: The chestnut is one of the most beautiful of our American forest trees. It was at one time very abundant in the eastern portion of the United States where it was highly valued for its light, durable timber and edible fruit. The leaves are large, oblong-lanceolate, of a smooth texture and coarsely dentate along the margins. They should be collected in the autumn and carefully dried.

Constituents: Tannic acid, 9 per cent; mucilage; resin.

Properties and Uses: Castanea is mildly astringent. It was once regarded as almost specific in whooping cough.

Dose: 60 gr. (4 Gm.).

Official Preparation: N.F. V.

Fluidextract of Castanea, 1 fl. dr. (4 cc.).

CHAPTER XIV

BETULACEÆ

(bĕt′ū̇-lā′sē̇-ē)

BIRCH FAMILY

This family consists of trees and shrubs and contains 6 genera and about 75 species, of wide distribution. They are characterized by their simple leaves, monœcious, rarely diœcious, flowers, and 1-seeded nutlike fruits.

OLEUM BETULÆ EMPYREUMATICUM RECTIFICATUM

(ō′lē̆-ŭm bĕt′ū̇-lī ĕm′pĭ-ro͞o-măt′ĭk-cŭm rĕk′tĭ-fī-cā′-tŭm)

RECTIFIED OIL OF BIRCH TAR—N.F.

Synonym: Birch Tar.

Source: Betula alba Linné (Fam. Betulaceæ).

Etymology: Oleum, the Lat. for "*oil.*"

Betula, the Lat. name of the "*birch tree.*"

Empyreumaticum from the Gr. "empyreuma," *a live coal covered with ashes,* from "empyreuein," *to set on fire,* i.e., caused or produced by burning.

Rectificatum from the Lat. "rectus," *straight,* and "facere," *to make,* i.e., to make right, to correct.

Part Used: The pyroligneous oil obtained by dry distillation of the bark and wood and rectified by steam distillation.

Description and Physical Properties: Rectified Oil of Birch Tar is a limpid, dark brown liquid having a penetrating, empyreumatic odor resembling that of Russia leather.

It yields clear solutions with 3 volumes of dehydrated alcohol, and with ether, chloroform, glacial acetic acid, amyl alcohol, oil of turpentine, benzene or carbon disulphide. When mixed with 3 volumes of alcohol or purified petroleum benzin, the solution is not more than slightly turbid, but a decided turbidity is produced when mixed with the same volume of methyl alcohol.

Habitat: Russia, Poland, Finland.

Discussion: This is a dark-brown liquid of penetrating, empyreumatic odor and a tar-like taste. Its specific gravity varies from 0.886 to 0.950 at 25° C.

Constituents: Guaiacol; creosol; cresol; phenol, trace.

Properties and Uses: Rectified oil of birch is not administered internally. Externally it is counter-irritant and anodyne and may be applied in the form of an ointment or liniment.

Official Preparation: N.F. V.

Compound Resorcinol Ointment.

CHAPTER XV

MORACEÆ

(mō̇-rā′sē̇-ē)

MULBERRY FAMILY

This is a family of trees and shrubs, having a milky juice and small declinous apetalous flowers with a one-celled ovary. They number about 55 genera and over 900 species, of wide distribution, nearly 600 species being comprised in the single genus Ficus.

FICUS

(fī′kŭs)

FIG—N.F.

Source: Ficus Carica Linné (Fam. Moraceæ).

Etymology: Ficus from the Celtic "figueren" or the Teutonic "fiege" (Saxon "fic"; Eng. "fig") the name given to both the tree and its fruit.

Carica, the Lat. name for the dried fig, from "Caria," *a town in Asia Minor.*

Part Used: The clean, sound, partially dried, ripe fruit.

Description and Physical Properties: *Whole Fig:* Usually compressed, of irregularly rounded shape, from 2.5 to 5 cm. in diameter, fleshy, light brown to yellow, frequently with an efflorescence of sugar; apex with a small, scaly orifice; base with a scar or short stalk; internally hollow, with numerous small, brownish-yellow, glossy, hard achenes. Odor distinctive, fruity; taste sweet, pleasant.

Habitat: Western Asia. Cultivated in region of Mediterranean coast of Italy and France; also in California, Florida and Texas.

Discussion: The fig tree is supposed to have come originally from the Levant and was introduced into Southern Europe at a very early period. It is extensively cultivated, especially in Italy and southern France.

The fig tree is a native of the Smyrna region but was brought over to this country in 1880 as it was thought that the soil and climatic conditions here should prove favorable. However, difficulties developed very early when cuttings, planted in California, attained bearing age but either failed to produce at all or bore stunted fruits of poor quality. Investigations revealed the fact that the Smyrna fig has to be pollinated by hand or by a particular fig wasp, known as *Blastophaga grossorum*. This insect develops in the capri or wild fig and on emerging carries with it pollen from the male capri fig to the female Smyrna fig flowers.

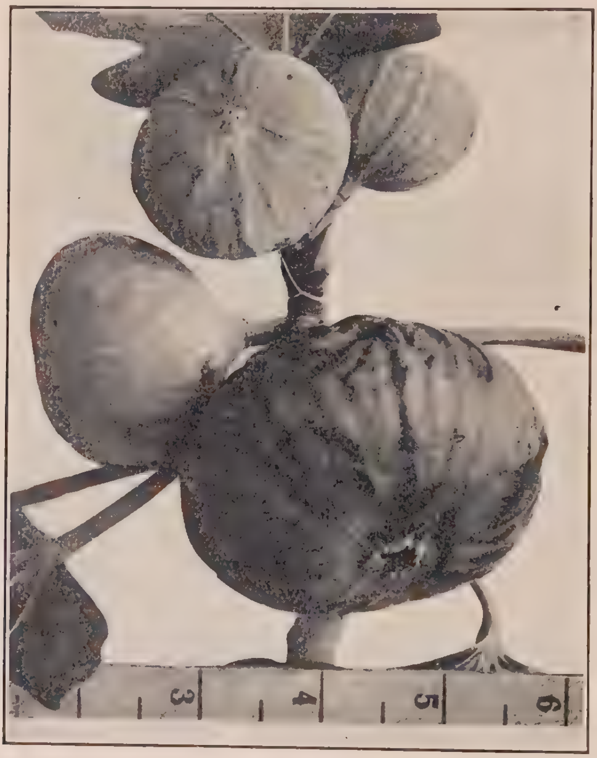


FIG. 22.—Figs attached to stem. (Courtesy of the United States Department of Agriculture.)

After this fact had been learned and quantities of Blastophaga had been imported, the production of figs in California progressed most satisfactorily. In the plantations a wild fig tree is planted to 3 or 4 or more of the cultivated trees to afford a supply of the fig wasps.

Another method that answers the same purpose is to cut branches from the wild fig and hang them in the cultivated trees when the latter are in bloom. Either of the processes described is known as "*caprification.*"

From this description it is evident that to produce Smyrna figs it is necessary to grow wild fig trees and develop fig wasps as well as the Smyrna trees themselves. California produces as much as 10,000,000 pounds of figs per year.

The so-called fruit is in reality the hollow end of a stem which bears the true fruits, or "*achenia*," commonly called the "*seeds*," on its inner surface. This receptacle, the walls of which become thick and fleshy during the ripening process, may be caused to hasten maturity by puncturing it with sharpened sticks or thorns which have been dipped in olive oil.

Figs may be left to dry on the trees, but usually are picked and dried in the sun, sometimes in ovens. They are then packed, under pressure, into drums or boxes and are called "*natural figs*." Another method is to knead and work them until quite pliant when they are packed and sold under the name of "*pulled figs*." The largest and best commercial varieties are the "Smyrna," "Turkey" and "Eleme" figs. The smaller and less pulpy variety are called "Greek" figs. Smyrna figs are now raised in California through caprification by imported fig wasps. They are of excellent quality and generally are produced under much better sanitary conditions than are many of the imported ones. During the year 1924, there were imported into this country, 42,464,895 pounds of figs.

CONSTITUENTS: Grape sugar, 62 per cent; gum; a peptonizing ferment called "*cradin*" which is claimed to be as active as pepsin.

PROPERTIES AND USES: Figs form a palatable, nourishing food. Because of the large percentage of indigestible, slightly irritant residuum (seeds and skins), they act as a gentle but efficient laxative. If the amount eaten, however, be too large, flatulency and diarrhea may result.

OFFICIAL PREPARATIONS: N.F. V.
Confection of Senna, 60 gr. (4 Gm.).
Compound Syrup of Fig, 1 fl. dr. (4 cc.).

CANNABIS

(kăn-nȧ′bĭs)

CANNABIS—U.S.P.

SYNONYMS: Cannabis Indica; Indian Hemp; Black Indian Hemp; Ganja; Guaza; Bangue; Bhang; Hashish· Gallow Grass; St. Andrew's Lace; Welsh Parsley; Churrus.

SOURCE: Cannabis sativa Linné (Fam. Moraceæ).

Etymology: Cannabis from the Gr. "kannabis," *hemp*, from the Celtic "can," *a reed.* and "ab," *small*, referring to the appearance of the stems.

Sativa from the Lat. "sativus," *cultivated.*

Part Used: The dried flowering tops of the pistillate plants.

Description and Physical Properties: *Unground Cannabis:* In separate tops or more or less agglutinated masses or fragments, consisting of the short stems with their leaf-like bracts and pistillate flowers or more or less developed fruits; color green to dark green or greenish brown; odor agreeable, somewhat heavy and narcotic; taste somewhat acrid and pungent.

Leaves digitately compound, usually broken. Leaflets when entire, linear-lanceolate, nearly sessile, margin deeply serrate. Bracts ovate, pubescent, each enclosing 1 or 2 pistillate flowers or more or less developed fruits. Calyx dark green, pubescent and somewhat folded around the ovary. Styles 2, filiform and pubescent. Ovary with a single campylotropous ovule. Stems cylindrical, longitudinally furrowed, light green to light brown, strigose-pubescent.

Habitat: Northern India, East Indies, Persia. Cultivated in the United States, Europe, central and southern Russia and Brazil.

Discussion: For a long time botanists regarded the hemp plant grown in India as a distinct species of Cannabis, and named it "*Cannabis Indica*" for that reason. Later researches, however, proved it to be only a variety of the European hemp, *Cannabis sativa.* Accordingly it retained the name "*Cannabis Indica*" as the official title of the drug, while the botanical name was changed to "*Cannabis sativa.*" Again, with the adoption of the U.S.P. IX, the official title was contracted to "*Cannabis*" and so remains in the tenth revision.

Cannabis is an annual plant, usually from 3 to 5 feet in height, and is extensively cultivated in many parts of the world for the fiber and seeds, as well as for the drug. The bast fibers, which are located in the inner bark of the stem, are extensively employed for making rope, sailcloth, bagging, etc. It is said to have been known in the East as a fiber plant before the time of recorded history, and the Scythians are believed to have used the fiber for making their garments. The seeds, so-called, which are in reality the fruits, contain an oily kernel from which about 20 per cent of a fixed oil is obtained by expression. This oil is employed in Russia for culinary purposes; also in paints and in the manufacture of soap. After the expression of the oil, the resultant "*cake*" is ground to a "*meal*" and constitutes a valuable stock food since it contains some 20 per cent of proteins.

Cannabis has been employed in Persia, Hindustan and other parts of the Orient, since very remote times, and in a variety of forms, as an intoxicant. *Bangue*, or *bhang*, is the name given to the dried powdered leaves, while *ganja*, *gauza*, etc., refer to the tops of the pistillate plants gathered immediately after flowering and formed into bundles. The names *churrus* and *hashish* refer to the resin which forms in the tops of the pistillate plants during the ripening process.

In Bengal the staminate plants are destroyed in the fields before the fertilization of the pistillate plants. This not only prevents the formation of the fruits, but increases the yield and quality of the resin as well. The importation of cannabis for 1924 amounted to but 202 pounds.

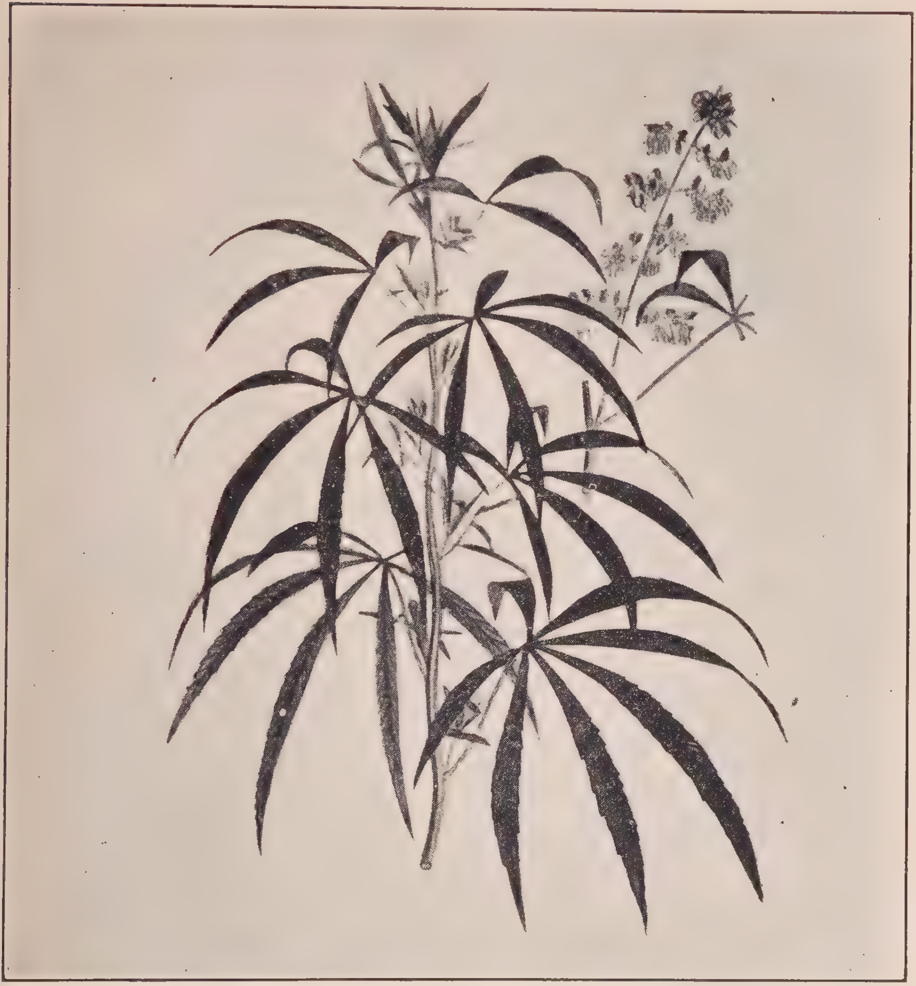


FIG. 23.—Cannabis sativa. (Courtesy of Parke, Davis & Company.)

CONSTITUENTS: Cannabin, a resinoid, 15 to 20 per cent; choline (cannabine), an alkaloid of a resinous or varnish-like consistency; cannabinol, a poisonous, reddish oil. Choline has an odor resembling that of nicotine.

Properties and Uses: Numerous medical observers are of the opinion that the usefulness of cannabis is very limited and that the attention given to it is quite out of proportion to its therapeutic value. Cannabis is said to be anodyne and narcotic, and is used empirically in many nervous conditions to relieve pain and prevent spasm. Thus it may ease the pain of neuralgia and relieve cough. It is used to control the spasms of chorea, epilepsy, tetanus and delirium tremens. It is employed in the treatment of morphine and chloral habits to quiet the distress caused by the withdrawal of those drugs, but must be used with extreme caution since it is itself a habit-forming drug.

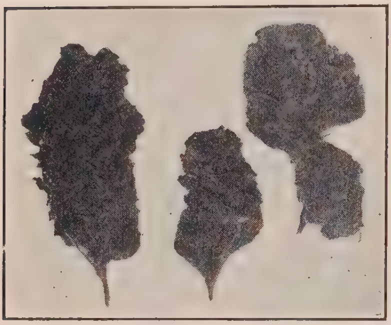


Fig. 24.—Cannabis sativa, as found in commerce.

Taken in narcotic doses, cannabis prevents the perception of time, state, or condition, and the relation of things. Some subjects will become pugnacious under its influence, while others experience delightful dreams in which the elements of time, space and sound are greatly magnified. Thus a dream of but a few moments' duration may seem to have extended over weeks; objects that are very near at hand may appear in infinite space; and whispers may sound like claps of thunder.

In cases of poisoning by cannabis, emetics should be given, followed by lemon juice to neutralize its effects. Coffee, aromatic spirit of ammonia or strychnine should then be administered as a stimulant. Spirit of nitrous ether, faradization, or artificial respiration may be employed to assist the heart action, as in poisoning by chloral hydrate or opium.

Official Preparations: U.S.P. X.

Extract of Cannabis, $\frac{1}{4}$ gr. (0.015 Gm.).

Fluidextract of Cannabis, $1\frac{1}{2}$ m. (0.1 cc.).

(*a*) HUMULUS

(hū′mŭ-lŭs)

HOPS—N.F.

(*b*) LUPULINUM

(lū′pŭ-lī′nŭm)

LUPULIN—N.F.

Source: Humulus Lupulus Linné (Fam. Moraceæ).

Etymology: Humulus from the Lat. "humus," *ground*, i.e., the plants creep along the ground unless supported.

Lupulus, the dim. of the Lat. "lupus," *wolf*. The hop vine was so named because it strangles shrubbery about which it twines.

Hops from the Anglo Saxon "hoppen," to *climb*, referring to its habit of climbing upon other plants or objects.

Part Used: (*a*) Hops—the carefully dried strobiles (from the Lat. "strobilus," *a pine cone*, which it resembles) bearing their natural glandular trichomes. A strobile is a cone-like aggregation of sporophylls, bearing sporangia, as in the club-mosses, horse-tails, etc. In the gymnosperms it is a cone, as in the pines, etc. In the other seed plants it is a spike-like, pistillate inflorescence as in the hop and is composed of persistent membranous imbricated bracts.

(*b*) Lupulin—the glandular trichomes (from the Gr. "trichoma," *a growth of hair*, i.e., any epidermal hair structure) separated from the strobiles.

Description and Physical Properties: (*a*) *Unground Hop:* Strobile ovoid-cylindrical, about 3 cm. in length, consisting of a narrow, hairy, flexuous rachis and numerous, imbricated, yellowish green, obliquely ovate, membranous scales, the base of each with numerous, yellowish-brown glandular hairs, and frequently infolded on one side, enclosing a subglobular, light brown, very glandular achene. Odor strong and characteristic, becoming disagreeable and valerian-like on aging; taste aromatic and bitter.

(*b*) A bright-yellowish-brown, granular powder, having the characteristic odor and taste of hop. Glandular trichomes somewhat globular or ellipsoidal, from 0.1 to 0.3 mm. in diameter, consisting of a single layer of secreting cells assuming the form of a shallow cup, from the inner surface of which the cuticle has been separated by the secreted yellowish-brown oleoresin.

Habitat: Europe, Asia, North America.

Discussion: The hop plant has a perennial root which sends up, each year, several angular stems. These will climb upon neighboring plants or other supports to a considerable height, always twining in a spiral direction from left to right.

England raises the most hops of any one country, with Germany second in production. In this country hops are cultivated in New England, New York, Michigan and Oregon. Hops ripen in the fall. They are then picked and carefully dried by artificial heat, the temperature being regulated so as not to rise above 70° C. Inferior grades which have become discolored from lying on the ground or from rains may be bleached with sulphur dioxide, but they must be carefully aerated before being used. Hops show a tendency to turn red on long exposure to light. A valerian-like odor is also developed in old samples. The lupulin is separated from the strobiles by rubbing them in sieves which permit the lupulin to pass through. The importation of hops for 1924 amounted to 406,250 pounds, while 8,990 pounds of lupulin were brought in during the same period.

Constituents: Hops—Lupulin, 0.6 to 0.8 per cent of a yellowish, bitter volatile oil possessing the characteristic odor of hops. This oil consists of a mixture of humulin, $C_{15}H_{24}$; dipentene, $C_{10}H_{16}$, and myrcen, $C_{10}H_{16}$. These constitute 80 per cent of the oil. In addition it contains esters of valeric acid, 10 to 18 per cent of resin and some tannin.

Lupulin contains about 2 per cent of a similar volatile oil, resin and wax.

Properties and Uses: On account of the bitter principle present in lupulin, both that drug and the hops from which it is obtained, are tonic and have been employed in cases of atonic dyspepsia. The volatile oil present renders them stomachic and carminative, increasing the appetite and promoting digestion. But of more importance are the anodyne, soporific and hypnotic properties which supervene after a preliminary but transitory cerebral excitement. Thus they are employed as sedatives in irritable bladder, incontinence of urine, delirium tremens and priapism. Hops, made into a poultice with hot water or vinegar, to which alcohol or laudanum may be added, are useful in rheumatism, colic, spasms and bruises, since they relieve pain and promote sleep. The tincture, combined with the tincture of capsicum, is one of the best restoratives following a drunken debauch.

Dose: (*a*) Hops, 30 gr. (2 Gm.).
(*b*) Lupulin, 8 gr. (0.5 Gm.).

Official Preparations: N.F. V.
(*a*) Fluidextract of Hop, 30 m. (2 cc.).
Tincture of Hop, 1 fl. dr. (4 cc.).
(*b*) Fluidextract of Lupulin, 8 m. (0.5 cc.).

CHAPTER XVI

ULMACEÆ

(ŭl-mā′sē̇-ē)

ELM FAMILY

There are 13 genera and about 140 species in this family. They are monœcious shrubs or trees growing in the temperate and tropical regions. The leaves are alternate, serrate and petiolate. The fruit is a one-seeded drupe or nut. Some, as the white elm, are used for ornamental purposes.

ULMUS

(ŭl′mŭs)

ELM—U.S.P.

Synonyms: Slippery Elm; Moose Elm; Red Elm; Indian Elm; Sweet Elm; Rock Elm; American Elm.

Source: Ulmus fulva Michaux (Fam. Ulmaceæ).

Etymology: Ulmus from the Celtic "elm" or "ulm," the name of the tree.

Fulva from the Lat. "fulvus," *deep yellow*, referring to the color of the inner bark.

Part Used: The dried inner bark.

Description and Physical Properties: *Unground Elm:* Usually broad, flat, oblong pieces, from 1 to 4 mm. in thickness; outer surface pale brown, roughened by longitudinal striæ and partially detached bundles of bast-fibers and with occasional thin, dark brown patches of adhering cork; inner surface light yellowish brown, finely striate, fracture fibrous, with projections of fine bast-bundles; odor distinctive; taste mucilaginous.

Habitat: Eastern United States as far west as Nebraska and Louisiana.

Discussion: The slippery elm is a large tree growing from 50 to 100 feet in height and from 1 to 3 feet in diameter. It grows best in open elevated places and requires a firm dry soil.

Constituents: The only important constituent of elm bark is the mucilage which exists in the cells, not as cell content, but as a metamorphosed cell wall. The powdered bark has often been adulterated, the chief adulterant being exhausted bark, i.e., the powdered bark from which the mucilage has been extracted. This sophistication can best be detected by macerating 1 gram of the powdered bark in 40 cc. of water. This should form a thick mucilage resembling that of flaxseed. Starch is also present as one of the normal constituents and aids as a diagnostic feature when examining the powdered drug.

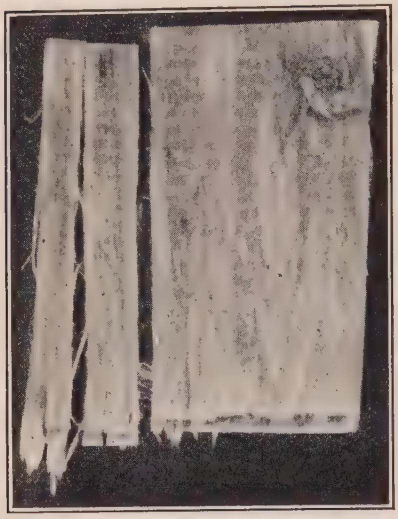


FIG. 25.—Elm bark.

PROPERTIES AND USES: Slippery elm bark possesses considerable value as a demulcent. The infusion best represents this action.

Externally the ground bark may be applied in the form of a hot poultice to boils, bruises, etc., in which it eases pain and favors rest.

CHAPTER XVII

PIPERACEÆ

(pĭp′ẽr-ā′-sē̇-ē)

PEPPER FAMILY

These are chiefly tropical herbs or shrubs. The leaves, which are alternate and entire, are characterized by having secretory cells, appearing in small translucent dots. These cells, which contain the volatile oils or oleoresins, are spheroidal in shape and have suberized walls. The fruit is a globular or egg-shaped berry.

PIPER

(pī′pĕr)

PEPPER—N.F.

Synonyms: Black Pepper; African Black Pepper; Peppercorn.

Source: Piper nigrum Linné (Fam. Piperaceæ).

Etymology: Piper and pepper from the Gr. "peperi," the name of the fruit, from "pepto," *to digest*, because of the condiment action of pepper in aiding digestion.

Nigrum from the Lat. "niger," *black*, referring to the color of the dried fruits.

Part Used: The dried, unripe fruit.

Description and Physical Properties: *Unground Pepper:* Nearly globular, from 3.5 to 6 mm. in diameter, epicarp very thin, easily separable from the sarcocarp; externally blackish brown or grayish black, coarsely reticulate; unilocular, 1-seeded; seed nearly white, hollow, adhering to the pericarp. Odor aromatic, slightly empyreumatic; taste aromatic and very pungent.

Habitat: Southern India (Malabar coast), Philippine Islands, Sumatra, Java, Ceylon, Borneo, Malucca Islands, Siam.

Discussion: The pepper plant is a perennial climbing vine with adventitious roots springing from the nodes and clinging to trees or other supports upon which it grows. The plant is propagated by means of cuttings. Trees (betel), props, or sometimes trellises, are provided

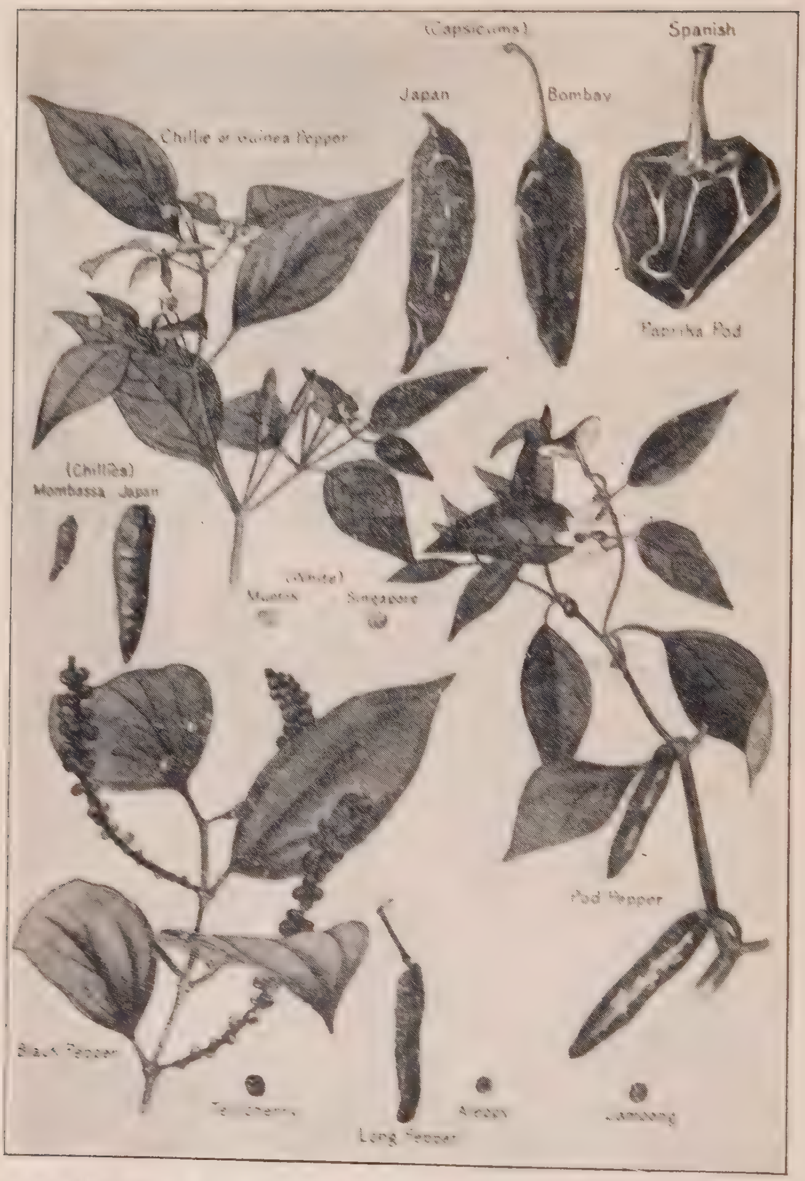


FIG. 26.—This figure shows several commercial varieties of pepper and capsicum. (Courtesy of McCormick & Company.)

to support the pepper vines. They begin to bear fruit when two to four years old and continue productive for about ten years. The berries are picked as soon as they begin to turn red, which is the first sign of ripening. They are then dried, whereupon they turn black and become wrinkled. The importation of black pepper during the year 1924 amounted to 29,432,463 pounds.

Constituents: Volatile oil, 1 to 2 per cent; resin; piperine, 5 to 8 per cent; piperidine, 0.5 per cent.

Properties and Uses: Pepper is mostly used as a condiment, stimulating the secretions of the mouth and stomach, thus increasing the appetite and promoting gastric digestion. As a stimulant and carminative, it relieves flatulence, colic and certain forms of indigestion. It is employed medicinally in the form of the powder or the oleoresin.

Dose: 8 gr. (0.5 Gm.).

Official Preparations: N.F. V.

Antiperiodic Tincture, 1 fl. dr. (4 cc.).
Antiperiodic Tincture without Aloe, 1 fl. dr. (4 cc.).

CUBEBA

(kū-bĕb′ȧ)

CUBEBS—U.S.P.

Synonyms: Tailed Pepper; Java Pepper.

Source: Piper Cubeba Linné filius (Fam. Piperaceæ).

Etymology: Cubeba from the Gr. "koubeba," the name of the fruit. Piper from the Gr. "peperi," the name of the pepper fruit, which it closely resembles.

Part Used: The dried, unripe, but nearly full-grown fruit.

Description and Physical Properties: *Unground Cubeb:* The upper portion of fruit nearly globular, from 3 to 6 mm. in diameter, abruptly contracted into a slender stem-like portion seldom exceeding 7 mm. in length; pericarp brown to very dark brown externally, rarely gray, coarsely reticulate, about 0.3 mm. in thickness; 1-locular, 1-seeded, the seed attached at the base of the pericarp and usually not completely filling the loculus; odor aromatic, characteristic; taste strongly aromatic and pungent.

Habitat: Borneo, Java, Sumatra. Cultivated in Ceylon and the West Indies.

Discussion: Like the pepper, the cubeb is a perennial climbing vine. It is largely grown on the coffee plantations of the countries referred to under "habitat," being trained upon the trees used as shade for the coffee trees. The berries have much the same general appearance as the black pepper except that the fruit stalk is a continuation of the pericarp and does not separate from the fruit as in the case of the pepper. It is for this reason that it is sometimes called "*tailed pepper.*" During the year of 1924, 50,637 pounds of cubeb were imported.

Constituents: Volatile oil, 5 to 15 per cent (contains a little dipentene, $C_{10}H_{16}$, but consists for the most part of a sesquiterpene, $C_{15}H_{24}$); resin; cubebin; cubeb camphor. (Oleoresin, about 20 per cent.)

Properties and Uses: When cubeb is taken internally its volatile oil is excreted by way of the skin, kidneys and bronchial mucous membrane, all of which are stimulated and it was thought that their secretions might be influenced favorably by the antiseptic properties of the drug. Thus it is administered, usually in the form of the oleoresin, and it may be combined with copaiba and santalwood oil, both of which act similarly. It is also employed as an expectorant for chronic bronchitis and catarrhal conditions of the respiratory tract. Cubebs, partially exhausted of the oleoresin and ground, are used largely in cubeb cigarettes.

Dose: 30 gr. (2 Gm.).

MATICO

(mȧ-tē′kō)

MATICO—N.F.

Source: Piper angustifolium Ruiz et Pavon (Fam. Piperaceæ).

Etymology: The name matico is said to have been given in honor of a Spanish soldier by that name who, upon being wounded, dragged himself to the shade of some of these bushes and, upon applying the leaves to lessen the flow of blood, discovered the styptic properties. Accordingly it is known in Spanish as "Yerba soldado" (*soldier plant*) or "Palo del soldado" (*soldier tree*).

Angustifolium from the Lat. "angustus," *narrow* and "folium," *leaf*, referring to the shape of the leaves.

Part Used: The dried leaves.

Description and Physical Properties: *Unground Matico:* Usually in compressed, matted masses with leaves more or less broken; leaves short petiolate, lanceolate, about 4 times as long as broad, from 10 to 20 cm. in length and from 2 to 5 cm. in breadth; apex tapering and acute; base slightly unequal, cordate, margin finely crenulate; upper surface dark green, distinctly tessellated; lower surface pale-green, reticulate with prominent, yellowish-brown midrib and veins forming small, quadrangular meshes clothed with matted pubescence. Odor distinct, aromatic; taste pungent, pepper-like.

HABITAT: Peru and neighboring countries of South America.

DISCUSSION: This is a shrub growing from 10 to 12 feet in height. It has a jointed stem and reticulated, sessile leaves from 2 to 6 inches in length and an inch in width. On the under side of the leaf are many brownish leaf hairs. The leaves have an agreeable aromatic odor and a spicy taste.

CONSTITUENTS: Volatile oil, 2 to 3 per cent; resin; tannin; a bitter principle.

PROPERTIES AND USES: Matico is aromatic, tonic, styptic and vulnerary, acting in part by constricting the capillaries and constringing other tissues. Because of its antiseptic and stimulating effect, matico is serviceable in the treatment of inflamed conditions of mucous membranes as in gonorrhœa and bronchitis. The leaves will arrest minor hemorrhage when locally applied to bleeding surfaces, probably due in part to the fine leaf hairs which cause a clotting of the blood.

DOSE: 60 gr. (4 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Matico, 1 fl. dr. (4 cc.).

KAVA

(kä′vȧ)

KAVA—N.F.

SYNONYMS: Kava Kava; Methysticum; Ava; Awa; Kawa.

SOURCE: Piper methysticum Forster (Fam. Piperaceæ).

ETYMOLOGY: Kava (also "kawa," "cava," or "ava") the Polynesian name of the plant.

Piper, the Lat. for "*pepper*," referring to the pungent taste.

Methysticum from the Gr. "methystikos," the name of the plant, from "methysis," *drunkeness*, referring to the action of a liquor prepared by the natives from the plant.

PART USED: The dried rhizome and roots.

DESCRIPTION AND PROPERTIES: *Unground Kava:* Consisting of a large, irregular knotty crown, often 12 cm. or more in diameter, from which proceed numerous, long, cylindrical, tough, nearly simple roots, which tend to fray out into bare, separated fibro-vascular bundles; sometimes cut into irregular angular pieces; the crown soft, light, spongy, and granular and very starchy; externally dark brown or blackish, the crown frequently partly scraped and light brown to light gray; internally white. Odor faint but characteristic; taste aromatic and pungent, slightly bitter, more or less local anæsthesia resulting.

HABITAT: Polynesia, i.e., the South Sea Islands.

DISCUSSION: Piper methysticum is a tall shrub of soft, light wood found growing in all the South Sea Islands from Hawaii to the East Indies. The rhizome consists of a large knotty crown from 2 to 6 inches in thickness and is composed of a soft, spongy texture in which the fibro-vascular bundles are very prominent. Several roots, 1 to 2 feet in length and from ½ to 1 inch in diameter, proceed from this crown. The natives prepare an intoxicating beverage by first chewing the soft, spongy mass into a pulp and subjecting this to fermentation. It produces a peculiar intoxication in which the mental faculties are but little disturbed while the motor functions, especially of the lower limbs, become greatly incoördinated.

CONSTITUENTS: Resin, 2 to 5 per cent; volatile oil; methysticin (similar to piperine), 0.3 per cent; glucoside; alkaloid, a trace.

PROPERTIES AND USES: Kava is stimulant, diaphoretic and tonic. It is employed in the treatment of a number of diseases of the urinary tract, as cystitis, urethritis and leucorrhœa.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Kava, 15 m. (1 cc.).

CHAPTER XVIII

POLYGONACEÆ

(pŏl′ĭ-gŏn-ā′sē-ē)

BUCKWHEAT FAMILY

This family comprises 30 genera and nearly 800 species. They are herbs, shrubs and trees, mostly herbaceous, and found for the most part in the North Temperate Zone. They have stipules forming a sheath around the stem. The flowers are spicate and apetalous. The fruit is a three or four-angled achene or nutlet.

RHEUM

(rē′ŭm)

RHUBARB—U.S.P.

Synonyms: Turkish Rhubarb; Chinese Rhubarb.

Source: Rheum officinale Baillon, or Rheum palmatum Linné (Fam. Polygonaceæ) or other species of Rheum grown in China and Thibet.

Etymology: Rheum from the Gr. "reon," *to flow,* from "Rha," the Greek name for the River Volga, along the banks of which rhubarb was first discovered.

Officinale from the Lat. "officina," *a work shop* or *store,* from the Lat. "opus," *work,* and "facere," *to do,* referring to the fact that it was kept for sale in the stores.

Rhubarb from the Gr. "Rha" (see above) and the Lat. "barbarum," *barbarian,* an ancient term meaning *foreigner,* i.e., a foreign plant from the region of the River Rha.

Palmatum from the Lat. "palma," *the palm of the hand,* referring to the shape of the leaves.

Part Used: The dried rhizome and roots deprived of most of the bark tissues and carefully dried.

Description and Physical Properties: *Unground Rhubarb:* In subcylindrical or flattened pieces, frequently showing a large perforation; from 5 to 17 cm. in length and from 4 to 10 cm. in diameter; outer surface yellowish brown with lighter colored striations and occasional small patches of brown cork; more or less covered with yellowish-brown powder; hard; fracture uneven, showing stellate vascular bundles and a granular, yellowish or pinkish-brown mottled surface; odor aromatic, agreeable; taste bitter and astringent.

HABITAT: Central Asia, Siberia, western and central China, Tartary.

DISCUSSION: Much difficulty was encountered in determining the exact botanical source of the rhubarb grown in Asia, partly because the regions of its production were so remote from the usual lines of travel by foreign tourists and partly on account of the jealous care observed by the inhabitants of these regions to prevent foreigners from gaining any accurate information concerning the plant.

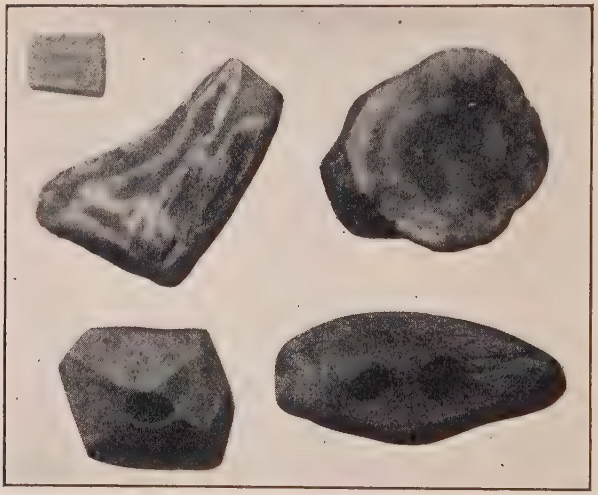


FIG. 27.—Rhubarb. The holes were bored through the lower pieces so that they might be strung on a cord and hung up to facilitate drying.

There are several species of Rheum furnishing the commercial drug, all of which are perennial, herbaceous plants resembling, more or less, our common garden rhubarb or *pieplant.* They grow abundantly upon the high table-lands of Tartary; also in Bhutan and Thibet on the northern slopes of the Himalaya mountains. The plant seems to do best in a light, sandy soil.

The rhizomes are left in the ground until they are about six years old when they are dug, cleaned and peeled and cut into suitable pieces for drying. The process of drying varies largely in different localities, but is usually very carefully done, a year sometimes being required to prepare a crop for the market. In some localities the rhizome is cut into cubes or slices, holes bored through these and the pieces strung on cords and hung about the tents; or they may be tied to the horns of sheep for the same purpose. It is claimed that the Chinese first place these slices of the cut root on hot stones and then finish the process of curing by exposing them to the sun and air.

For a long time the Russian Government monopolized the rhubarb trade, compelling the Chinese to send the entire output to St. Petersburg (Leningrad). It entered Russia through the frontier post towns, where a strict surveillance was maintained. At these points the drug was subjected to a rigorous inspection, the poorer samples being burned, while those which passed the inspection were put into linen bags which were then covered with pitch and skins and forwarded to St. Petersburg.

Some of the rhubarb of that day was carried by caravans from Tartary through Persia and Anatolia to Turkey where it then entered the Russian post towns and was known as "*Turkish rhubarb.*" Later this rigorous inspection was suddenly dispensed with by order of the Russian Government for purely commercial reasons. At present rhubarb is chiefly purchased for the European markets at the city of Hankow on the upper Yang-tse, that from Hsining commanding the highest price, and is carried to Europe by water. The importation of rhubarb during 1924 amounted to 141,911 pounds.

Constituents: Chrysophanic acid, dioxy-β-methylanthraquinone, $C_{14}H_5(CH_3)(OH)_2\{O_2$; emodin, trioxymethylanthraquinone, $C_{14}H_4(CH_3)(OH)_3\{O_2$; rhabarberon, isomeric with emodin; rhein, $C_{14}H_5O_2(OH)_2CO.OH$; rheo-tannic acid and calcium oxalate.

Properties and Uses: Rhubarb in small doses acts as a gastric tonic and intestinal astringent, the bitter principle and the rheotannic acid predominating, but in doses of 30 to 40 grains, it produces a distinct catharsis, the stools being colored yellow. It usually acts in from 4 to 8 hours and is followed by the astringent effect of the rheotannic acid. Thus it may be used in cases of cholera infantum or diarrhea due to acrid or fermentating substances in the bowel, the object being first to eliminate the cause of the trouble and then to secure the astringent effect of the rhubarb. As a stomachic, rhubarb is often combined with sodium bicarbonate or magnesium oxide, both of which are antacid and aid in certain forms of dyspepsia.

It is highly esteemed as a cathartic for children on account of the mildness of its action, and although it will occasionally cause griping, it does not inflame the gastro-intestinal mucous membrane. The aromatic syrup and the mixture of rhubarb and soda (U.S.P. VIII) are among the preparations most suitable for children.

On account of the mildness of its action, rhubarb may be used for constipation accompanied by hemorrhoids, the astringent after-effect being overcome by administering from 2 to 4 teaspoonfuls of olive or mineral oil at night.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Extract of Rhubarb, 8 gr. (0.5 Gm.).
Fluidextract of Rhubarb, 15 m. (1 cc.).
Compound Rhubarb Powder, 30 gr. (2 Gm.).
Syrup of Rhubarb, 2½ fl. dr. (10 cc.).
Aromatic Syrup of Rhubarb, 2½ fl. dr. (10 cc.).
Tincture of Rhubarb, 1 fl. dr. (4 cc.).
Aromatic Tincture of Rhubarb, 1 fl. dr. (4 cc.).

RUMEX

(rōō'mĕks)

RUMEX—N.F.

SYNONYMS: Yellow Dock; Curled Dock.

SOURCE: Rumex crispus Linné, and Rumex obtusifolius Linné (Fam. Polygonaceæ).

ETYMOLOGY: Rumex, the Lat. for *sorrel.*

Crispus, the Lat. for *crumpled,* referring to the curled appearance of the leaves.

Obtusifolius from the Lat. "obtusus," *blunt,* and "folium," *leaf,* referring to the shape of the leaves.

PART USED: The dried root.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Rumex:* Nearly simple, slightly tapering, with few if any rootlets, somewhat twisted, up to 30 cm. in length and 7 cm. in diameter, externally reddish brown or grayish from adhering soil, finely annulate above, deeply wrinkled longitudinally, marked with small indented root scars which are often transversely elongated and with occasional stem scars or remains of stem, the latter being hollow and finely striated; leaf buds few, obconical; fracture short and dusty, somewhat fibrous; usually split longitudinally or cut into transverse pieces about 2 cm. in length. Odor slight; taste astringent and somewhat bitter.

HABITAT: Europe, North America.

DISCUSSION: This is a perennial, herbaceous plant with a yellow fusiform root which penetrates the soil to the depth of a foot or more. The annual stems rise to the height of 2 to 4 feet and bear smooth, lanceolate, curled leaves and large panicles of greenish flowers. The fruit is 3-angled and wingless. Several of the species have sour leaves due to the presence of acid potassium oxalate and a trace of tartaric acid. These are commonly called "*sorrels*" in contra-distinction to the others which are known as "*docks*."

Constituents: Crysophanic acid; emodin; tannin; acid potassium oxalate.

Properties and Uses: Rumex is alterative and laxative. The young leaves are highly valued as a pleasant, agreeable, laxative diet, served in the same manner as spinach.

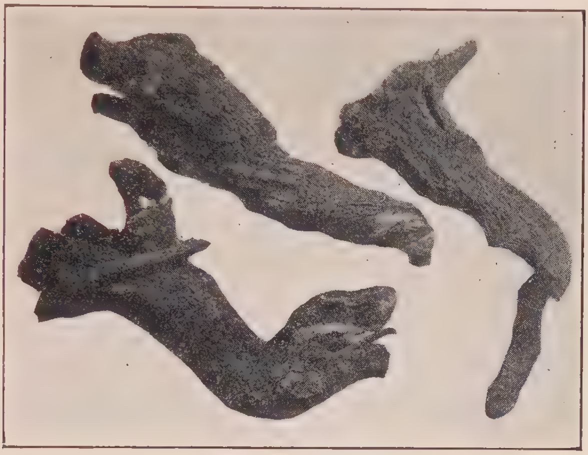


Fig. 28.—Rumex.

Dose: 1 dr. (4 Gm.).

Official Preparation: N.F. V.

Fluidextract of Rumex, 1 fl. dr. (4 cc.).

CHAPTER XIX

CHENOPODIACEÆ

(kē′nō̇-pō′dĭ-ā′sē̇-ē)

GOOSEFOOT FAMILY

This is a widely distributed family consisting of annual or perennial herbs with inconspicuous greenish flowers. The fruit is a one-seeded achene. An interesting feature is the presence, in certain species, of bladder-like hairs for the storing of water.

(*a*) CHENOPODIUM

(kē′nō̇-pō′dĭ-ŭm)

CHENOPODIUM

(*b*) OLEUM CHENOPODII

(ō′lē̇-ŭm kē′nō̇-pō′dĭ-ī)

OIL OF CHENOPODIUM—U.S.P.

Synonyms: American Wormseed; Goosefoot; Jerusalem Tea or Oak.

Source: Chenopodium ambrosioides var. anthelminticum (Linné) A. Gray (Fam. Chenopodiaceæ).

Etymology: Chenopodium from the Gr. "chen," *goose*, and "pous," *foot* ("podion," *a little foot*), referring to the resemblance of the leaf of the plant to the webbed foot of the goose.

Ambrosioides from the Gr. "ambrosia," from "a," *not* and "brotos," *mortal*, and "oides," *like*, i.e., immortal, or conferring immortality.

Anthelminticum from the Gr. "anti," *against*, and "helmintha," *a worm*, especially the tapeworm, referring to the medicinal property of the drug.

Part Used: (*a*) The fruits.

(*b*) The volatile oil distilled with steam from the fresh, overground parts of the flowering and fruiting plant. Must yield not less than 65 per cent of ascaridol.

Description and Physical Properties: (*b*) A colorless or pale yellowish liquid, having a peculiar, disagreeable odor, and a bitter, burning taste.

Habitat: Eastern United States, West Indies, Central and South America.

Discussion: This is a common weed in some parts of the United States, growing along roadsides, in vacant lots and about rubbish piles. The fruit is very small, about the size of a pinhead, and contains a glossy black seed. During 1924, 1506 pounds of chenopodium were imported.

Constituents: Of the over-ground parts: volatile oil, 3 to 3.5 per cent. Of the oil: ascaridol, $C_{10}H_{16}O_2$, 62 to 70 per cent; cymol, $C_{10}H_{14}$, about 22 per cent.

Properties and Uses: The medicinal values of chenopodium are due to the volatile oil which is anthelmintic, sedative and anti-malarial. It is largely employed as a vermifuge against the roundworm (Ascaris lumbricoides), hook-worm and intestinal amebas. It may be administered either in the form of the powder or the volatile oil mixed with sugar, syrup or molasses. As a vermifuge it should be given two or three times a day, preferably on an empty stomach in or followed by a dose of castor oil. Chenopodium rather frequently produces somewhat toxic effects.

Dose: (*b*) Oil of chenopodium, 15 m. (1 cc.).

CHAPTER XX

PHYTOLACCACEÆ

(fī′tȯ-lă-kā′sē̇-ē)

POKE ROOT FAMILY

This family consists of herbs, shrubs and trees. It numbers 10 genera and about 60 species, chiefly tropical. The flowers occur in racemes and the fruits consist of many carpels.

PHYTOLACCA

(fī′tȯ-lăk′ȧ)

PHYTOLACCA—N.F.

Synonyms: Poke Root; Poke Weed; Virginia Poke; Garget.
Source: Phytolacca americana Linné (Fam. Phytolaccaceæ).
Etymology: Phytolacca from the Gr. "phyton," *plant*, and the Lat. "lac," *lac* or *milk*, referring to the color of the juice which is of a lac or crimson hue.
Americana, of or pertaining to America, i.e., the American species.
Part Used: The dried root.

Description and Physical Properties: *Unground Phytolacca:* Cylindrical, or somewhat tapering, sparingly branched, from 3 to 7 cm. in thickness, mostly in transverse or longitudinal slices; externally yellowish brown, finely longitudinally or spirally wrinkled and thickly annulate with lighter colored, low ridges; fracture fibrous, characterized by alternating layers of fibro-vascular tissue and parenchyma, the layers of the latter being much retracted. Odor slight; taste sweetish, afterwards highly acrid.

Habitat: Eastern and Central North America.

Discussion: Phytolacca is a large perennial, herbaceous plant, growing from 6 to 8 feet in height, in the northern states, and as high as 10 or 12 feet farther south. Its annual, purplish stems are hollow and often reach several inches in diameter. The smooth, green leaves are ovate in shape, and from 4 to 5 inches in length. The greenish-white flowers occur in long, terminal, pyramidal racemes and are followed in fruit by purplish berries, each containing ten seeds. The root is large and quite fleshy, resembling somewhat that of the horse-radish, for which it has sometimes been mistaken. The fresh young shoots are sometimes eaten like asparagus and do not seem to be harmful if well cooked. The purplish juice of the berries is sometimes used for coloring wines, its color becoming very beautiful when acted upon by the acid present. Poke root occurs in the market in the form of cylindrical pieces from 1 to 3 inches in length, or in longitudinal or transverse slices. It is yellowish brown in color and possesses a slight odor and a sweetish acrid taste.

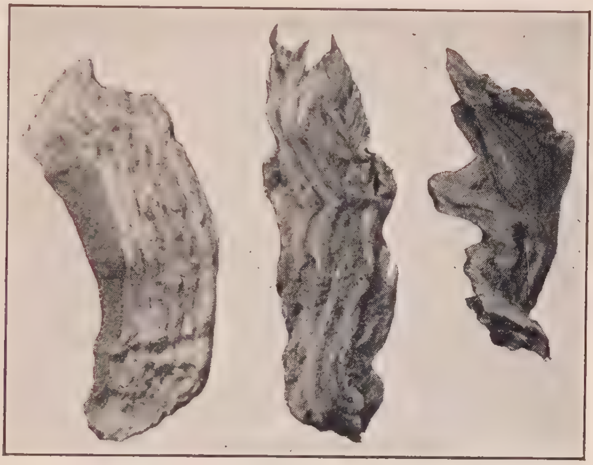


Fig. 29.—Phytolacca.

Constituents: Phytolacca contains a poisonous, saponin-like body which is the active principle; phytolaccic acid.

Properties and Uses: Phytolacca is alterative and emetic, but is rarely employed, since very much more satisfactory drugs are now available for these purposes.

Dose: Emetic, 15 gr. (1 Gm.). Alterative, 1½ gr. (0.1 Gm.).

Official Preparations: N.F. V.

Fluidextract of Phytolacca, Emetic, 15 m. (1 cc.).
Alterative, 1½ m. (0.1 cc.).

CHAPTER XXI

LAURACEÆ

(lô-rā'sē-ē)

LAUREL FAMILY

The members of this family are found mostly in the tropics. They are spicy, aromatic shrubs and trees and comprise about 45 genera and over 900 species. Oil cells with suberized walls are characteristic. Many of the species contain mucilage cells also. There is evidently some relation between the two, for in those species of cinnamon which are deficient in oil, large numbers of mucilage cells abound, while in those that contain abundant oil there are fewer mucilage cells.

CINNAMOMUN

(sĭn'ȧ-mō'mŭm)

CINNAMON—U.S.P.

Source: Cinnamomum Loureirii Nees (Fam. Lauraceæ).

Etymology: Cinnamomum from the Arabic "kinnamon," from "qaneh," *a reed*, or *cane*, from the resemblance of the stems; or possibly from the Malayese "kaju," *sweet* and "manis," *wood*, from its aromatic odor and taste.

Part Used: The dried bark, which is required to yield not less than 2 per cent of volatile ether-soluble extractive.

Description and Physical Properties: *Unground Cinnamon:* In quills up to 30 cm. long and 4 cm. in diameter, the bark from 0.5 to 3.0 mm. in thickness, or in broken irregular pieces or in flattened slabs up to 8 mm. in thickness; the outer surface light brown to dark purplish brown, with grayish patches of crustose lichens and numerous bud-scars, finely wrinkled when from young twigs, otherwise, more or less rough from corky patches surrounding the lenticels; inner surface reddish-brown to dark brown, granular and slightly striate; fracture short; odor characteristic and aromatic; taste sweetish, aromatic and pungent.

Habitat: Cochin China. Cultivated in Java, Sumatra and South America.

Discussion: The native home of the Ceylon cinnamon (Cinnamomum zeylanicum, U.S.P. IX) was a narrow strip of coast land in the

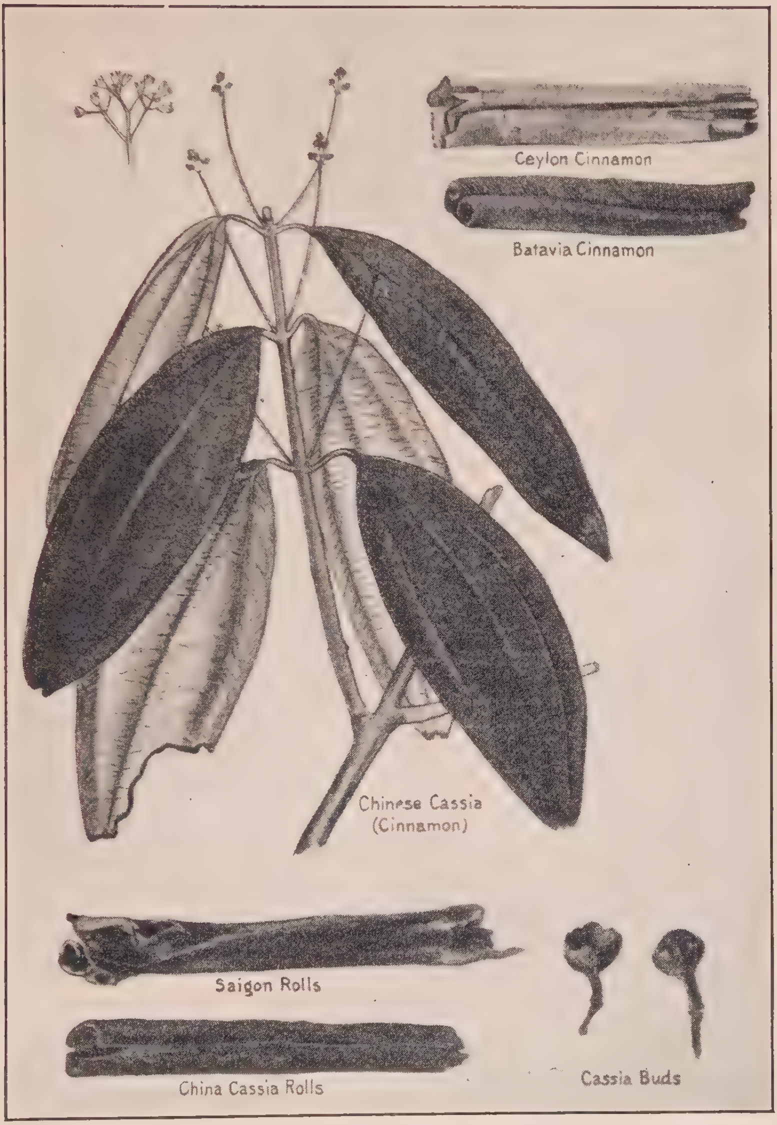


FIG. 30.—Branch, flowers, buds, leaves and bark of cinnamon. (Courtesy of McCormick & Company.)

southwestern part of the island. In this region the most favorable conditions of soil, moisture and climate are found. It seems that the best cinnamon is grown on the poorest soil where there is an annual rainfall of nearly 100 inches and an average temperature of 85° F.

The cinnamon tree grows to the height of 20 to 30 feet and from a foot to 18 inches in diameter. On the cinnamon plantations of Ceylon, however, the trees are cut off near the ground so that a large number of shoots or *sprouts* will start up from the stump. It is from these shoots that the Ceylon cinnamon is obtained.

In the harvesting of Ceylon cinnamon the season lasts from May until October. The laborer collects a bundle of the shoots, cuts off the tops and takes them to the peeling shed. There the bark is divided into two strips by means of incisions running the length of the shoots. After these incisions are made, the shoots are again formed into bundles and allowed to remain for a time during which it is claimed a fermentation takes place which facilitates the separation of the epidermis. When the proper condition has been reached the epidermis is removed with a knife. The workman now places the smaller quills within the larger ones forming a "*pipe*" of some 6 or 8 thicknesses of bark. The latter dries and curls up forming the characteristic roll or "*quill*" of the Ceylon cinnamon. The chips and scrapings are then distilled for the recovery of the volatile oil. Powdered cinnamon has sometimes been found to contain an admixture of these exhausted portions. It will be noted that the foregoing discussion refers solely to the Ceylon cinnamon which was not included in the tenth revision of the pharmacopœia. The present official cinnamon is the entire bark of the above-noted species and requires no such treatment to prepare it for the market. The importation statistics show that 1,772,547 pounds of cinnamon bark were imported in 1924.

Constituents: Volatile oil, 0.5 to 2 per cent; tannic acid.

Properties and Uses: Cinnamon is used as an aromatic flavor in foods, medicines and confectionery. It is also carminative and stomachic, relieving flatulence, increasing the appetite and promoting gastric digestion. As an astringent it is useful in diarrhea and dysentery. Its stimulant and anti-spasmodic actions render it useful in nausea and vomiting; also as a corrective to purging drugs to prevent griping

Dose: 4 gr. (0.25 Gm.).

Official Preparations: U.S.P. X.

Compound Tincture of Cardamom, 1 fl. dr. (4 cc.).
Compound Tincture of Gambir, 1 fl. dr. (4 cc.).
Compound Tincture of Lavender, 30 m. (2 cc.).
Aromatic Tincture of Rhubarb, 1 fl. dr. (4 cc.).

OLEUM CINNAMOMI

(ō′lē-ŭm sĭn′ȧ-mō′mī)

OIL OF CINNAMON—U.S.P.

Synonym: Oil of Cassia.

Source: Cinnamomum Cassia (Linné) Blume (Fam. Lauraceæ).

Etymology: See under "Etymology," page 134.

Part Used: The volatile oil distilled from the leaves and twigs, rectified by steam distillation, and containing not less than 80 per cent by volume of cinnamic aldehyde (C_9H_8O).

Description and Physical Properties: A yellowish or brownish liquid, becoming darker and thicker with age or exposure to the air, and having the characteristic odor and taste of cassia cinnamon.

Habitat: Cochin China. Cultivated in Java, Sumatra and South America.

Discussion: For a general description of the plant yielding this oil, see pages 134 and 136.

Constituents: Cinnamic acid, upwards of 75 per cent. The official oil must contain at least 80 per cent. In addition it contains small amounts of several terpene compounds.

Medicinal Properties and Uses: Oil of cinnamon is perhaps the most active antiseptic of any of the volatile oils. It is a powerful flavoring agent and finds rather wide use for this purpose in a variety of pharmaceutical products. Medicinally, it acts much like the other volatile oils, namely as a carminative and warm, pungent aromatic.

Dose: 1½ m. (0.1 cc.).

Official Preparations: U.S.P. X.

Cinnamon Water, 4 fl. dr. (15 cc.).
Spirit of Cinnamon, 15 m. (1 cc.).

CAMPHORA

(kăm-phō′rȧ)

CAMPHOR—U.S.P.

Synonyms: Gum Camphor; Formosa Camphor; Japanese Camphor; Laurel Camphor.

Source: Cinnamomum Camphora (Linné) Nees et Ebermaier (Fam. Lauraceæ).

Etymology: Camphora and Camphor from the Arabic "kafur," which in turn was derived from the Malayese "kapur," *chalk* or *lime.*

Under the name "*kafur*" or "*kamfur*," the substance was first traded in by the Arabs.

Cinnamomum (see preceding drug).

PART USED: The dextrogyrate ketone ($C_9H_{16}CO$).

DESCRIPTION AND PHYSICAL PROPERTIES: White, translucent, tough masses or granules. It has a penetrating, characteristic odor, and a pungent, aromatic taste. It is readily pulverizable in the presence of a little alcohol, ether, or chloroform. It slowly volatilizes at ordinary temperatures.

One Gm. of Camphor is soluble in about 800 cc. of water, 1 cc. of alcohol, 0.5 cc. of chloroform, and in 1 cc. of ether, at 25° C. It is freely soluble in carbon disulphide, petroleum benzin, and in fixed or volatile oils.

HABITAT: China, Japan, Formosa. Cultivated in India and Ceylon. Grown also in Italy, California and Florida as an ornamental tree.

DISCUSSION: The camphor tree has been transplanted into nearly every tropical and subtropical country. The chief obstacle to its more extensive commercial cultivation seems to be the extreme slowness of its growth, making the returns on the investment too long deferred. Where conditions are favorable for its development, the camphor tree attains an immense size and resembles our common basswood or linden in appearance.

The trunk, roots and larger limbs are all used for the recovery of the camphor. The method differs somewhat in different sections, but in all cases depends upon the process of sublimation. The process described here is the one used in many districts of Japan, and will serve to illustrate the principles involved. The tree is reduced to chips by hand labor and subjected to sublimation as follows: A still is constructed by first building a round arch of stone about 2 feet in height and the same in diameter. On the top of this arch is placed a broad, shallow cast-iron kettle resembling an evaporating dish in shape. Fitted closely to this kettle or "*boiler*" is a wooden vat about the size of a barrel, but resembling an old-fashioned churn in shape and appearance. This vat has a removable cover which may be clamped down tightly, and is plastered on the outside with mud, several inches in thickness, in order to maintain a steady, even temperature. This vat is connected near the top by a bamboo joint to a wooden tub which is inverted within a second tub of larger diameter, but not so tall. A stream of cold water is kept flowing over the inverted tub which then serves as a condenser.

Water is placed in the iron kettle, the vat above it is filled with chips, the cover clamped down tightly and a fire started within the stone arch. As the hot steam passes up through the perforated bottom of the vat, the camphor and volatile oil within the chips are volatilized.

These vapors pass through the bamboo joint into the cooled, inverted tub and condense, the camphor crystallizing on the rice straw which has been placed in the upper part of this tub for that purpose, while the oil drops down and collects on the surface of the water. About twelve hours are required for distilling a vat full of chips by this method. When the distillation is completed the chips are removed from the vat and dried for the next day's fire, while a new charge of fresh chips is put in the vat. At the same time the camphor and the oil are removed from the condensing chamber. By this method, from 20 to 40 pounds of chips are required to produce one pound of crude camphor. The crude product has a pinkish color and must be refined before it is ready for the market. This was formerly done in Europe and America, but is now accomplished for the most part in Japan by the Japanese Camphor Monopoly.

Camphor can be made artificially, from several different substances, one of them being oil of turpentine. The process yields about 35 per cent of a camphor resembling the natural product in every way, except in its odor and in its action on polarized light. In this process a substance identical with oil of lemon is formed as a by-product. The artificial process is difficult of operation and thus far has had but little effect upon the camphor trade.

The first use of camphor known was by the Arabians who employed it as a refrigerant and an aphrodisiac. The oil of camphor contains a large amount of safrol which is also present in the oil of sassafras. In fact, safrol from the oil of camphor has been offered on the market as a pure substitute for oil of sassafras which it resembles very closely.

PROPERTIES AND USES: Camphor has many medicinal properties and a large variety of therapeutic uses. Thus, it is employed as a stimulant and antispasmodic in hysteria, coughs, asthma, epilepsy and chorea. It is used as a carminative and stomachic in flatulence, colic and tenesmus. As a sedative and diaphoretic it is employed in colds, influenza and la grippe. It dilates the blood vessels and increases peristalsis and the flow of the gastric juice. It is locally applied as an antiparasitic, in canker sores, ulcers and gangrene. Externally, camphor is used in the form of liniments and ointments; the spirit for sprains, bruises, rheumatic and other pains. Most of the camphor is used in the manufacture of celluloid.

DOSE: 3 gr. (0.2. Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Camphor Water, 2½ fl. dr. (10 cc.).
Camphor Liniment.
Chloroform Liniment.

Soap Liniment.
Spirit of Camphor, 15 m. (1 cc.).
Camphorated Tincture of Opium, 1 fl. dr. (4 cc.).
Flexible Collodion.

(*a*) SASSAFRAS

(săs′ȧ-frăs)

SASSAFRAS—N.F.

(*b*) SASSAFRAS MEDULLA

(săs′ȧ-frăs mē̆-dŭ̥l′ȧ)

SASSAFRAS PITH—N.F.

(*c*) OLEUM SASSAFRAS

(ō′lē̆-ŭm săs′ȧ-frăs)

OIL OF SASSAFRAS—U.S.P.

Synonyms: Ague Tree; Cinnamon Wood; Saloop.

Source: Sassafras variifolium Salisbury (O. Kuntze) (Fam. Lauraceæ).

Etymology: Sassafras from the Lat. "saxum," *rock*, and "frangere," *to break*, because the plant often grows in the crevices of rocks which the growing stems and roots force apart.

Variifolium from the Lat. "varius," *varied*, and "folium," *leaf*, because the leaves show a variety of shapes.

Part Used: (*a*) The bark of the roots.
(*b*) The pith of the small branches.
(*c*) The volatile oil distilled from the root.

Description and Physical Properties: (*a*) *Unground Sassafras:* In irregular, transversely curved or quilled pieces, from 1 to 15 cm. in length and from 1 to 4 mm. in thickness; outer surface orange brown, nearly smooth and marked with more or less irregular ridges; inner surface light to dark reddish brown, obscurely short-striate; fracture short with a thin, reddish brown, corky layer and a yellowish white inner bark. Odor aromatic; taste slightly mucilaginous, astringent, aromatic and somewhat pungent.

(*b*) In sub-cylindrical, often curved or coiled pieces, from 2 to 10 cm. in length and from 2 to 5 mm. in diameter; very light in weight, externally whitish, occasionally with small fragments of adhering wood; fracture short. Odor slight, sassafras-like; taste mucilaginous.

(*c*) A yellow or reddish-yellow liquid, having the characteristic odor and taste of sassafras.

Habitat: North America.

Discussion: Sassafras is quite common throughout the eastern portion of the United States. In New England it is only a shrub, but farther south it increases in size until in the southern states it grows from 50 to 70 feet in height and a foot or more in diameter. The leaves vary considerably in form and size, even on the same plant, some of them being ovate and entire, while others are two or three lobed.

The bark of the root should be gathered late in the fall or early the following spring. The best time for collecting the pith is in the fall after the appearance of frost. Maryland is the center of the production of sassafras.

Oil of sassafras is obtained by steam distillation. It is heavier than water and but slightly soluble, therefore separates and settles to the bottom (sp. gr. 1.065–1.077) on cooling. When the oil is subjected to a very low temperature, crystals of safrol ($C_{10}H_{10}O_2$) separate out. This substance is known as "*sassafras camphor*" and constitutes about 90 per cent of the weight of the oil. The so-called "*artificial oil of sassafras*" is not a synthetic product as the name might imply, but merely safrol obtained from the oil of camphor.

Constituents: (*a*) Sassafras (bark): Volatile oil, 5 per cent; sassafrid; tannin.

(*b*) Sassafras pith: Mucilage.

(*c*) Sassafras oil: Safrol, the methylene ether of allyl-dihydroxybenzene. Oil of sassafras also contains some eugenol ($C_{10}H_{12}O_2$), a colorless aromatic liquid related to the phenols.

Properties and Uses: A hot infusion made from sassafras bark is alterative, stimulant and diaphoretic, and is popular as a "*blood purifier*."

The mucilage made from the pith of the branches is a very pleasant and agreeable demulcent and is especially serviceable in conjunctivitis and other local inflammations. It is employed as a demulcent drink in acute gastritis, dysentery and corrosive poisoning.

Oil of sassafras is carminative, stimulant, and has an agreeable, aromatic flavor. Thus it is a popular flavoring agent for confections, mouth washes and a great variety of pharmaceutical preparations.

Dose: (*a*) Sassafras (bark), 2½ dr. (10 Gm.).
(*c*) Sassafras oil, 1½ m. (0.1 cc.).

Official Preparations: N.F. V.
(*a*) Sassafras (bark):
Compound Fluidextract of Sarsaparilla, 30 m. (2 cc.).
Compound Syrup of White Pine, 1 fl. dr. (4 cc.).
Compound Syrup of White Pine with Morphine, 30 m. (2 cc.).
(*b*) Mucilage of Sassafras Pith, 4 fl. dr. (15 cc.).

CHAPTER XXII

CANELLACEÆ

(kăn′ĕ-lā′sḗ-ē)

CANELLA FAMILY

This is a small family consisting of 4 genera and about 8 species. They are mostly tropical or subtropical trees with evergreen leaves. The flowers have a calyx of three sepals, the stamens united into a tube. The fruit is a berry.

CANELLA

(kȧ-nĕl′ȧ)

CANELLA—N.F.

Synonyms: False Winter's Bark; White Cinnamon.

Source: Canella Winterana (Linné) Gaertner (Fam. Canellaceæ).

Etymology: Canella from the Fr. "cannelle," dim. of the Lat. "canna," *a reed*, referring to the shape of the rolls of the prepared bark.

Winterana, a name formed by adding a Latin ending to the word *winter*, referring to the whitish color of the bark.

Part Used: The dried rossed bark.

Description and Physical Properties: *Unground Canella:* In quills usually from 1 to 3 cm. long and from 1 to 4 cm. thick, occasionally 2 or 3 times this size, or in irregular fragments of bark, from 1.5 to 5 mm. thick and 2 to 3 cm. wide, the outer periderm mostly removed; outer surface light brownish yellow or pale orange brown, more or less scaly, with a few very shallow fissures, often more or less reticulate with slight ridges; inner surface pale yellow, somewhat smooth, but showing coarse, longitudinal striæ; fracture short and sharp, pale yellow internally with an irregular, slightly darker band at the center. Odor slight unless the bark is heated, then aromatic, resembling that of cinnamon; taste aromatic, warm, somewhat bitter and mucilaginous.

Habitat: Florida, West Indies.

Discussion: The plant furnishing this drug is a small, evergreen tree of beautiful appearance and very aromatic odor. The bark is of a silver-gray color which accounts for the specific as well as for the various common names of the tree. When collected for the market, the bark is divested of its silver-gray outer layer, only the inner layer of periderm being retained. Most of the drug is obtained from New Providence, one of the Bahama Islands. The drug occurs in the form of quills or quilled strips which are of a light-yellow or ochre-yellow color externally and show transversely elongated scars. These quills vary from a few inches in length to 2 or more feet, depending on the part of the tree from which they are taken.

CONSTITUENTS: Volatile oil; resin; bitter principle.

PROPERTIES AND USES: Canella is stimulant and tonic. Because of its aromatic property it is added to purgative mixtures to relieve griping.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Powder of Aloe and Canella, 5 gr. (0.3 Gm.).

CHAPTER XXIII

BERBERIDACEÆ
(bûr′bẽr-ĭ-dā′sē-ē)

BARBERRY FAMILY

This is a small family numbering about 20 genera and 105 species. It consists of herbs and shrubs, growing mostly in temperate climates. The leaves are simple or compound. The flowers occur singly or in racemes. The sepals and petals are imbricated in several series. The fruit is either a berry or a capsule.

BERBERIS
(bûr′bẽr-ĭs)

BERBERIS—N.F.

Synonyms: Rocky Mountain Grape; Oregon Grape; California Barberry; Holly-leaf Barberry; Trailing Mahonia.

Source: Species of the section Mahonia (Nuttall) De Candolle of the genus Berberis Linné (Fam. Berberidaceæ).

Etymology: Berberis from "berberys," the Arabian name for the fruit.

Part Used: The dried rhizome and roots.

Habitat: Colorado, California, Oregon, British Columbia.

Discussion: Several species of berberis are found in the Rocky Mountain region. The one in question is a low-trailing, glabrous shrub.

Description and Physical Properties: *Unground Berberis:* Cylindrical, more or less knotty, strongly branched, usually cut into pieces of varying length and up to 45 mm. in diameter; usually splitting somewhat on drying; externally light-yellowish brown, longitudinally wrinkled and short scaly; fracture hard and tough; bark 1 mm. in thickness, easily separable into layers; wood yellow, the color more pronounced upon wetting, distinctly radiate, and showing rings of growth; pith of rhizome small, sometimes eccentric. Odor slight; taste distinctive, very bitter; on chewing it tinges the saliva yellow.

The flowers are numerous, but are very small and are of a yellowish color. They are followed by clusters of purple berries containing an acrid pulp. The slender roots are brownish on the exterior, but yellow within.

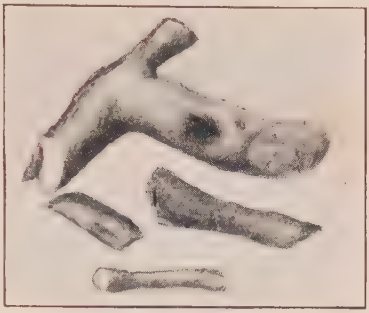


FIG. 31.—Berberis.

CONSTITUENTS: Berberine, $C_{20}H_{18}NO_4.OH$, 2 to 2.5 per cent; berbamine, $C_{18}H_{19}NO_3.2H_2O$; oxyacanthine, $C_{19}H_{20}NO_2.OH$, 2.8 per cent.

PROPERTIES AND USES: Berberis is useful as an alterative and, being a simple bitter, as a tonic in a number of conditions of deficient appetite and supply of gastric juice, improving the quality and quantity of the latter in such cases.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Berberis, 30 m. (2 cc.).

PODOPHYLLUM

(pŏd′ō-fĭl′ŭm)

PODOPHYLLUM—U.S.P.

SYNONYMS: Mandrake; May Apple; Devil's Apple; Indian Apple; Umbrella Plant; Ground Lemon; Wild Lemon.

SOURCE: Podophyllum peltatum Linné (Fam. Berberidaceæ).

ETYMOLOGY: Podophyllum from the Gr. "pous," *foot*, and "phyllon," *leaf*, i.e., the shape of the leaf.

Peltatum from the Lat. "pelta," *a shield*, i.e., shield shaped, referring to the shape of the leaf.

PART USED: The dried rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Podophyllum:* Rhizome nearly cylindrical, jointed, compressed on the upper and lower surfaces, sometimes branched; in pieces usually less than 20 cm. in length, the internodes from 2 to 9 mm. in diameter, some of the nodes thickened; dark brown; longitudinally wrinkled or nearly smooth, with irregular, somewhat V-shaped scars of scale leaves; some of the nodes annulate, the upper portion with large, circular, depressed stem-scars and with buds or stem-bases; on the lower portion numerous root-scars or roots from 2 to 7 cm. in length and about 2 mm. in thickness; fracture short; internally the cork light brown, the wood portion a circle of small yellowish vascular bundles and the pith large and white; odor slight; taste disagreeably bitter and acrid.

HABITAT: Canada and the northern portion of the United States. Collected commercially in the Ohio River Valley. (Is said to grow in the Holy Land.)

DISCUSSION: Podophyllum is a perennial, herbaceous plant found in moist, shady woods in many parts of the United States. The stem is about a foot in height, of a pale-green color, and is apparently branched near the top into two parts which, in reality, are petioles, each bearing a large shield-shaped leaf nearly a foot in diameter. In the fork of the two petioles occurs a single white flower about 2 inches in diameter. The flower has a sweet odor and a waxy appearance.

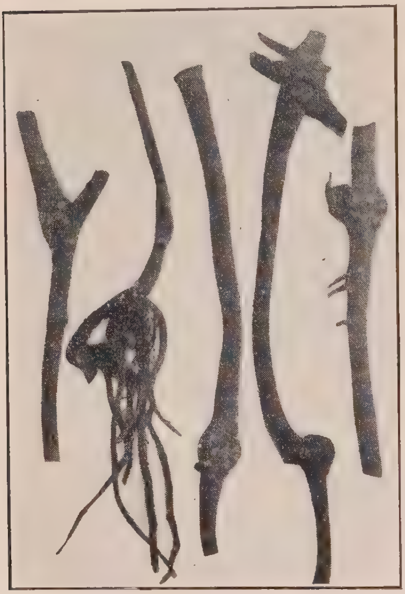


FIG. 32.—Podophyllum.

The fruit is a large, oval berry, yellow when ripe, and containing many seeds embedded in a sweet, fleshy pulp. The plant spreads by means of the rhizome which creeps just beneath the surface of the soil, growing by a terminal bud. The rhizome is often several feet in length and is much branched. Thus the plants are found growing in patches covering considerable areas. The flowers appear in May and the fruit ripens in September. The rhizome is collected in the autumn after the falling of the leaves.

CONSTITUENTS: Resin (podophyllin), 3 per cent. Podophyllin is composed of a number of closely related, resinous substances consisting of the following: podophyllotoxin, picropodophyllin, podophylloquercetin, a resinous podophyllinic acid, a resinous podophylloresin and a cholesterin-like compound. Its medicinal action resembles that of calomel to such an extent that it is often called "*vegetable calomel.*"

PROPERTIES AND USES: Podophyllum increases the intestinal secretions and, according to some authorities, augments the flow of bile. In cathartic doses it produces profuse watery stools attended with some nausea and griping. While its action is probably more intense on the small intestine, it is more or less irritant to the entire intestinal tract.

It resembles jalap and calomel somewhat, but is slower in action, requiring from eight to twenty-four hours to produce its cathartic effect.

It is employed in small doses in chronic constipation, generally in combination with other laxatives and correctives. Its tendency to cause griping may be overcome by combining with a little hyoscyamus, belladonna or volatile oils.

Official Preparation: U.S.P. X.

Resin of Podophyllum, $\frac{1}{6}$ gr. (0.01 Gm.).

CAULOPHYLLUM

(kô′lŏ-fĭl′ŭm)

CAULOPHYLLUM—N.F.

Synonyms: Blue Cohosh; Papoose Root; Squaw Root.

Source: Caulophyllum thalictroides (Linné) Michaux (Fam. Berberidaceæ).

Etymology: Caulophyllum from the Gr. "kaulos," *stem*, and "phyllon," *leaf*, referring to the single triternately divided leaf.

Thalictroides from the Gr. "thaliktron," *meadow rue*, and the Lat. "oides," *like*, i.e., bearing a resemblance to the meadow rue.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Caulophyllum:* Rhizome of horizontal growth, from 7 to 25 cm. long and from 5 to 15 mm. thick, much branched, slightly compressed from above, bearing large, cup-shaped stem scars on the upper surface and underneath roots which frequently conceal the rhizome; roots in a tangled or matted mass, long, curved, tortuous, thin, tough, profusely branched, the branches of about equal size and diverging at angles of about 45°; both rhizome and root of a grayish or yellowish-gray color; fracture tough and woody. Odorless but sternutatory; taste bitter-sweet and acrid.

Habitat: Canada, United States.

Discussion: Caulophyllum is a perennial, herbaceous plant growing about 2 feet in height. The stem is smooth and covered with a whitish bloom. It bears one triternately compound leaf near its summit. The leaflets have either three or five lobes each. It also has a terminal raceme of about twelve greenish-yellow flowers. These are followed in fruit by capsules, each of which contain two globular seeds. The growing seeds, enclosed in their blue, fleshy integuments, rupture the capsules and bear a striking resemblance to the blueberry.

Constituents: Caulophyllin; resin; tannin.

Properties and Uses: Caulophyllum is diuretic, anthelmintic and emmenagogue; large doses, oxytocic. It is employed in amenorrhœa, dysmenorrhœa and other uterine disorders. It was used by the American Indians as a parturient.

Dose: 8 gr. (0.5 Gm.).

Official Preparations: N.F. V.

Compound Elixir of Aletris, 1 fl. dr. (4 cc.).
Compound Elixir of Helonias, 1 fl. dr. (4 cc.).
Fluidextract of Caulophyllum, 8 m. (0.5 cc.).

CHAPTER XXIV

MENISPERMACEÆ

(mĕn′ĭ-spẽr-mā′sḗ-ē)

MOONSEED FAMILY

These are herbaceous or woody climbers with small, greenish or white, 3-parted, diœcious flowers and curved embryo. There are about 60 genera and 350 species of wide distribution. The leaves are entire or lobed. The fruit is a drupe containing a crescent-shaped seed from which the family derives its name.

CALUMBA

(kȧ-lŭm′bȧ)

CALUMBA—U.S.P.

Synonyms; Columbo; Colombo; Columba; Calumbo.

Source: Jateorrhiza palmata (Lamarck) Miers (Fam. Menispermaceæ).

Etymology: Calumba from "kalumb," the native African name of the plant, from "colombo," the Ceylonese name, given in honor of the city of that name.

Jateorrhiza from the Gr. "iater," *healing*, and "rhiza," *root*, referring to its medicinal properties.

Palmata from the Lat. "palmatus," *palm of the hand*, i.e., the leaves are palmately lobed.

Menispermaceæ from the Gr. "mene," *the moon*, and "sperma," *seed*, i.e., the seeds are crescent-shaped.

Part Used: The dried root.

Description and Physical Properties: *Unground Calumba:* Circular or oval discs, attaining a diameter of 10 cm. and seldom exceeding 2 cm. in thickness, or longitudinal or oblique slices, attaining a length of 30 cm.; the edge brown and roughly wrinkled, the cut surfaces yellowish brown or grayish yellow and indistinctly radiate in the region of the dark cambium; often depressed in the central portion; fracture short and mealy; odor slight; taste slightly aromatic and very bitter.

Habitat: South Africa, Madagascar, Mozambique.

Discussion: This is a perennial, climbing plant with one or two slender, woody stems proceeding from a large, fleshy root. It grows abundantly in the thick, shady forests of Mozambique, extending from the sea many miles inland. The roots which are often 2 or 3 inches in diameter, are dug during the dry season, usually March. They are washed and sliced into transverse discs to facilitate drying. On drying, the center of the disc becomes somewhat depressed because it is composed of large cells containing much moisture, while the outer layers are more woody and consequently shrink less.

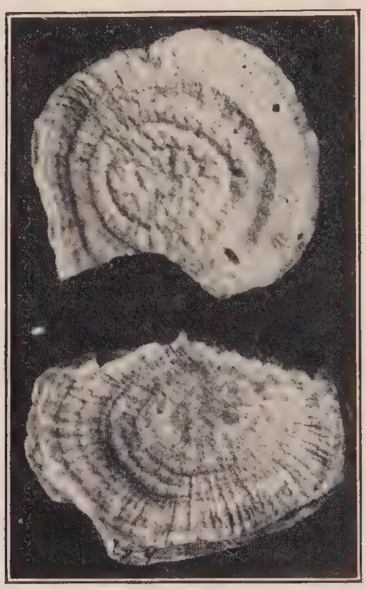


Fig. 33.—Calumba.

Calumba is sometimes adulterated with the roots of "bryonia" (Frasera carolinensis), known as "*American calumba.*" These are sliced in the same manner as the true calumba, dyed yellow with turmeric or saffron and made bitter with the infusion of calumba or quassia, thus giving a very close resemblance. A careful inspection, however, will reveal the absence of the dark cambium zone and the radiating lines of the true calumba. 53,983 pounds of calumba were imported in 1924.

Constituents: Berberine, 1 per cent; calumbin, 0.8 per cent; calumbic acid.

Properties and Uses: Calumba is a simple bitter. It promotes appetite and the quantity and quality of the gastric secretions. Since it contains no tannic acid, it will not cause constipation, and can be administered with iron salts when an hematic tonic action is desired. Calumba is tonic and stomachic, serviceable in atonic dyspepsia accompanying debility or a general run-down condition.

Dose: 15 gr. (1 Gm.).

Official Preparation: U.S.P. X.

Tincture of Calumba, 1 fl. dr. (4 cc.).

PAREIRA

(pȧ-rā′rȧ)

PAREIRA—N.F.

Synonym: Pareira Brava.

Source: Chondodendron tomentosum Ruiz et Pavon (Fam. Menispermaceæ).

Etymology: Pareira from the Pg. "parreira," *a vine.*

Brava from the Pg. "brava," *wild.*

Chondodendron from the Gr. "khondros," *a grain* (as of wheat), and "dendron," *tree,* referring to the jointed stem.

Tomentosum from the Lat. "tomentum," *a stuffing of wool, hair* or *feathers,* referring to the hairy under-surface of the leaves.

Part Used: The dried root.

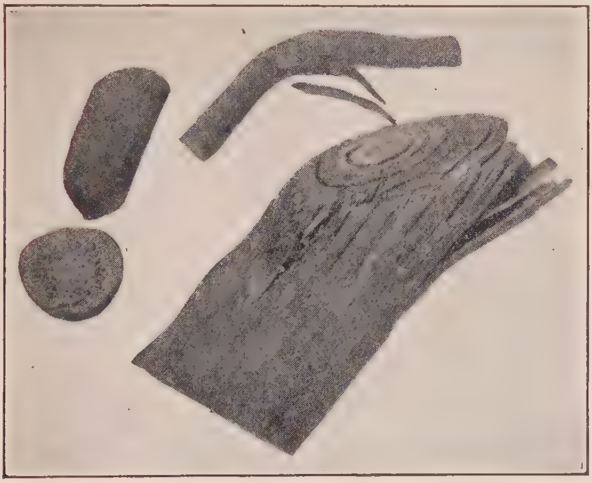


Fig. 34.—Pareira.

Description and Physical Properties: *Unground Pareira:* Nearly cylindrical or more or less tortuous, of variable length and from 1 to 6 cm. in diameter; externally brownish black with transversed ridges on knot-like projections, occasionally fissured and longitudinally wrinkled or even furrowed; hard, heavy and tough; when freshly cut having a waxy luster; the transverse surfaces exhibiting several successive concentric zones of fibro-vascular bundles, each from 2 to 4 mm. in width with crenated borders and separated by distinct zones of parenchyma and stone cells, the zones radially marked by prominent medullary rays. Stems deeply furrowed, grayish in color, usually covered with foliaceous patches of lichens; internally grayish yellow, with a prominent development of wood, with a tendency to separate fibro-vascular bundles, and without a waxy luster. Odor slight; taste very bitter.

HABITAT: Brazil, Peru.

DISCUSSION: This plant is a tall, woody climber, very abundant in the upper Amazon region. Its stem varies from ½ to 3 or 4 inches in diameter and has a rough, dark-colored bark and ovate leaves from 6 to 12 inches in length. The under surface of the leaf is covered with fine woolly hairs. The flowers are diœcious and are arranged in panicles. The fruits are dark-purplish drupes and hang in a bunch like a cluster of grapes.

CONSTITUENTS: Pelosine (also known as bebirine, bibirine, nectandrine), 0.5 per cent; an alkaloid; tannin.

PROPERTIES AND USES: Pareira is diuretic and somewhat alterative and tonic. It seems to exert a beneficial, stimulating effect upon the mucous membrane of the genito-urinary tract and is employed in pyelitis, urethritis, cystitis and leucorrhœa.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Pareira, 30 m. (2 cc.).

COCCULUS

(kŏk′ŭ-lŭs)

COCCULUS—N.F. V.

SYNONYMS: Cocculus Indicus; Fish Berry; Indian Berry.

SOURCE: Anamirta Cocculus (Linné) Wright et Arnott (Fam. Menispermaceæ).

ETYMOLOGY: Cocculus from the Gr. "kokkos," *a grain* or *seed*.
Indicus, the Lat. for *Indian*.

PART USED: The dried, ripe fruit containing not more than 2 per cent of foreign organic matter.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Cocculus:* Reniform, 8 to 13.5 mm. long, 7 to 11 mm. wide and 7 to 10 mm. thick, blackish brown or reddish brown, wrinkled; hilum and micropyle close together; separated by a shallow sinus and connected by an obscure ridge running around the convex side; distinct circular stalk scar. Pericarp tough about 1 mm. thick, outer layer brownish, inner layer light yellow enclosing a single seed. Seed whitish yellow, urn-shaped, its longitudinal and transverse sections crescent-shaped, taste bitter, the seed intensely bitter.

HABITAT: East Indies, Southern Asia, especially along the Malabar coast.

DISCUSSION: This is a perennial, woody climber growing in the mountainous districts of the above-named localities. The fruit is a small red, kidney-shaped drupe the seed of which resembles somewhat the berry of the bay laurel. The fruits are collected by the natives, who dry them in the sun and sell them to the native buyers.

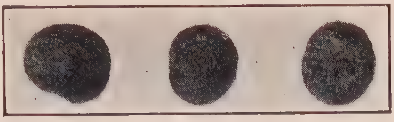


FIG. 35.—Cocculus.

CONSTITUENTS: Two alkaloids, menispermine and paramenispermine, are found in the fruit coat, while picrotoxin, a poisonous, neutral, bitter substance occurs in the seed.

PROPERTIES AND USES: Because of the picrotoxin present in the seed, cocculus is poisonous and has been used in India since early times for stupefying fish. Its use in medicine is practically confined to the destruction of lice. It is not employed internally.

OFFICIAL PREPARATION: N.F. V.

Tincture of Cocculus.

CHAPTER XXV

MYRISTICACEÆ

(mĭ-rĭs′tĭk-kā′sē̇-ē)

NUTMEG FAMILY

These are tropical, evergreen trees and shrubs numbering about 80 species. The flowers are small, the staminate and pistillate ones occurring on separate plants. The fruit has a fleshy pericarp enclosing a hard seed which is encased within a fleshy arillode. Secretory cells containing a semi-fluid or crystalline substance and having suberized walls occur in all parts of the plant.

(*a*) MYRISTICA

(mĭ-rĭs′tĭk-kȧ)

MYRISTICA—U.S.P.

(*b*) OLEUM MYRISTICÆ

(ō′lē̇-ŭm mĭ-rĭs′tĭk-kē)

OIL OF MYRISTICA—U.S.P.

Synonyms: (*a*) Nutmeg.
(*b*) Oil of Nutmeg.

Source: Myristica fragrans Houttuyn (Fam. Myristicaceæ).

Etymology: Myristica from the Gr. "myristikos," *of* or *pertaining to ointments*, i.e., it was originally used for flavoring ointments.

Fragrans, the Lat. for *sweet-scented*, referring to the odor.

Part Used: (*a*) The ripe seed deprived of its seed coat and with or without a thin coating of lime.

(*b*) The volatile oil distilled from the dried kernels of the ripe seeds.

Description and Physical Properties: (*a*) *Unground Myristica:* Ovoid or ellipsoidal, from 20 to 30 mm. in length and about 20 mm. in thickness; externally light brown to dark brown; reticulately furrowed, the broad end with a large, circular, upraised scar from which arises a groove extending to a depression at the opposite

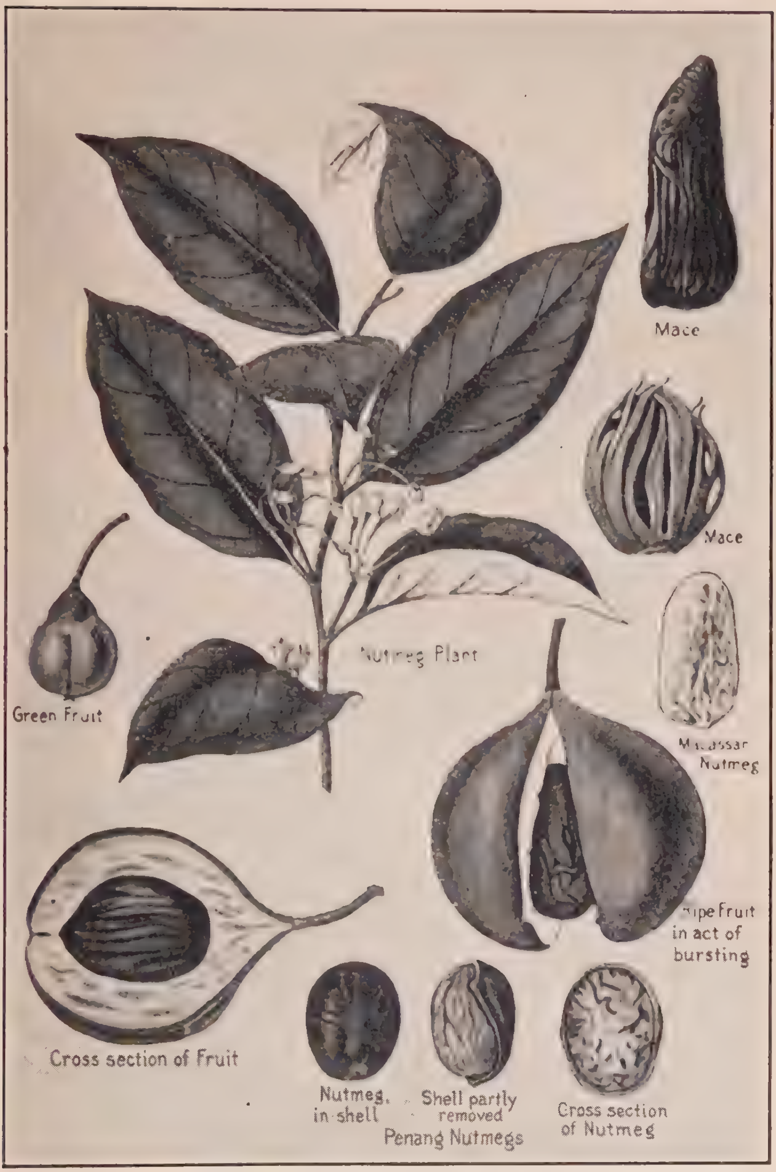


FIG. 36.—Nutmeg and mace. (Courtesy of McCormick & Company.)

end; the cut surface having a waxy luster and mottled brown appearance; odor characteristically aromatic, taste pungently aromatic.

(*b*) A colorless or pale-yellow liquid, having the characteristic odor and taste of nutmeg.

HABITAT: Molucca Islands. Cultivated in India, Philippine Islands, Amboyna, Boura, New Guinea, Ceylon, Sumatra and Java.

DISCUSSION: The nutmeg tree grows about 30 feet in height and resembles the orange tree in general appearance. It is diœcious, the staminate flowers occurring in clusters, while the pistillate flowers are solitary. Both are very small and of a pale yellowish color. The tree bears fruits and flowers, without intermission, for a period of seventy or eighty years. The fruit is oval and smooth and resembles a small peach in general appearance. The kernel is enclosed in a hard, brownish shell which shows furrows or depressions caused by the closely appressed arillode which incompletely covers the seed. The arillode was official in the pharmacopœia of 1890 under the title of "*mace*."

As the fruit ripens, the pericarp dehisces along the longitudinal furrow, exposing the arillode. The fruits are then gathered by the aid of a long pole to which a hook and basket are attached. The principal harvesting seasons occur in April, July and November. The pericarp is first removed and rejected, while the arillode is carefully separated and dried. This constitutes the "*mace*" of the market. The seeds are then dried, either in the sun or in ovens, for a number of days, then in smokehouses until the kernels rattle within their shells. The shells are then broken open by striking them a sharp blow with a small, wooden mallet. The purpose is, of course, to secure the kernels without breaking or bruising them. The kernels are then steeped for a short time in milk of lime to protect them from the attack of insects. The importation of nutmeg during the year 1924 amounted to 3,682,033 pounds. During the same period, 740,484 pounds of mace were brought in.

The volatile oil is obtained from the kernel of the ripe seed and is separated by distillation with water or steam. It is then a colorless or pale-yellow liquid of characteristic odor and taste. The fixed oil, also known as nutmeg butter, is obtained by crushing the kernels, placing them in bags and exposing them to the action of steam, after which they are strongly pressed between hot plates.

CONSTITUENTS: (*a*) Volatile oil, 2 to 15 per cent; fixed oil, 25 to 30 per cent; starch; proteins.

PROPERTIES AND USES: Myristica is carminative and stomachic, increasing the flow of gastric juice, aiding the appetite and promoting gastric digestion. It is principally employed as a condiment or flavoring agent and seasoning for food, but is used medicinally as a stimulant and carminative in flatulence, colic and indigestion. Oil of myristica is employed as a corrective, adjuvant and flavor.

DOSE: (*a*) Nutmeg, 8 gr. (0.5 Gm.).
(*b*) Nutmeg oil, $\frac{1}{2}$ m. (0.03 cc.).

OFFICIAL PREPARATIONS: U.S.P. X.
(*a*) Compound Tincture of Lavender, 30 m. (2 cc.).
Aromatic Tincture of Rhubarb, 1 fl. dr. (4 cc.).

CHAPTER XXVI

RANUNCULACEÆ

(rȧ-nŭn′kū̆-lā′sē̤-ē)

CROWFOOT FAMILY

These are annual or perennial, herbaceous plants, not perfectly distinguished by any one or two particular marks, but may be recognized in a general way by having an acrid, watery juice, numerous stamens and usually more than one pistil. All parts of the flower are separate from each other and inserted on the receptacle. The family contains a number of cultivated, ornamental plants such as the clematis, aquilegia, pæonia and anemone. Several members of this family contain the alkaloid berberine which is also found in the berberidaceæ, and menispermaceæ.

STAPHISAGRIA

(stăf′ĭ-sā′grĭ-ȧ)

STAPHISAGRIA—U.S.P. IX

Synonyms: Stavesacre; Larkspur Herb; Semen Pedicularis.

Source: Delphinium Staphisagria Linné (Fam. Ranunculaceæ).

Etymology: Staphisagria from the Gr. "staphis," *a raisin* or *dried grape*, because the fruit clusters resemble those of the wild grape.

Delphinium from the Gr. "delphin(ion)," *a dolphin*, because the form of the nectary resembles the figure of the dolphin.

Part Used: The ripe seeds.

Description and Physical Properties: Irregularly triangular, flattened, or somewhat tetrahedral, one side being convex, from 4 to 7 mm. in length and from 3 to 6 mm. in breadth; externally dark brown, becoming lighter with age, and coarsely reticulate; easily cut, showing a somewhat light brown, oily endosperm, enclosing a small embryo at the pointed end; odor slight, disagreeable; taste intensely bitter and acrid.

Habitat: Southern Europe. Cultivated in France and Italy.

Discussion: This is a pretty, herbaceous plant growing from 1 to 2 feet in height, with a simple, erect, downy stem and palmate, five- to seven-lobed leaves. The flowers occur in terminal racemes and are of a bluish-purple color.

Constituents: Delphinine; delphinoidine; staphisagrine; delphisine.

Properties and Uses: The Greeks and Romans employed staphisagria as an emetic and cathartic, but on account of the poisonous character of the drug its internal administration has practically ceased. Its employment at the present time is confined to that of a parasiticide for destroying lice and the itch mite.

Dose: 1 gr. (0.06 Gm.).

DELPHINIUM

(dĕl-fĭn′ĭ-ŭm)

LARKSPUR SEED—N.F.

Synonyms: King's Consound; Staggerweed.

Source: Delphinium Ajacis Linné (Fam. Ranunculaceæ).

Etymology: Delphinium (see preceding page).

Part Used: The dried, ripe seed.

Description and Physical Properties: *Unground Larkspur Seed:* Irregularly tetrahedral, or somewhat triangulate, acute at one end, obtuse or rounded at the other, about 2 mm. in length and equally broad or slightly narrower; surface black or blackish brown, occasionally grayish with from 8 to 12 rows of radially elongated epidermal cells transversely encircling the seed and forming wavy continuous vertical walls or ruffles occasionally intersecting and with narrow channels between; seed-coat crustaceous; endosperm whitish, fleshy and oily; embryo small, in fleshy endosperm. Odor very faint; taste bitter, afterward biting and acrid.

Habitat: Central Europe. Widely cultivated as a garden flower.

Discussion: There are about 120 species of delphinium, a number of which are common throughout several localities of Europe and more or less naturalized in the United States where they cause considerable trouble as a poison to stock. The one in question is an annual herb whose seeds are gradually replacing those of staphisagria as a medicinal drug.

Constituents: The constituents of delphinium are, as far as is known, similar to those of staphisagria.

Properties and Uses: The properties and uses of delphinium are the same as those of staphisagria, which see.

Official Preparation: N.F. V.

Tincture of Delphinium.

ACONITUM

(ăk′ŏ-nī′tŭm)

ACONITE—U.S.P.

SYNONYMS: Monkshood; Wolfsbane; Friar's-cap; Cuckoo's-cap; Blue rocket; Friar's-cowl; Jacob's-chariot; Face-in-hood.

SOURCE: Aconitum Napellus Linné (Fam. Ranunculaceæ).

ETYMOLOGY: Aconitum from the Gr. "a," *without*, and "konis," *dirt* or *soil*, because the plant grows on stony ground where there is but little soil.

Napellus, the Lat. for "little turnip," from "napus," *a turnip*, referring to the shape of the root.

PART USED: The dried, tuberous root answering the official biological test.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Aconite:* More or less conical or fusiform, from 4 to 10 cm. in length, and from 1 to 3.5 cm. in diameter at the crown; externally dark brown or grayish brown, smooth or longitudinally wrinkled, the upper end with a bud, or remains of bud-scales and a stem-scar, the other portions with numerous root-scars or short rootlets; fracture short, horny or somewhat mealy; internally whitish, light brown, or dark brown; bark, 1 to 2 mm. in thickness, cambium zone usually 5- to 8-angled; odor very slight; taste sweetish, soon becoming acrid and developing a tingling sensation, followed by numbness. (*Taste cautiously.*)

HABITAT: Mountainous regions of Europe, Asia and North America.

DISCUSSION: This is a perennial, herbaceous plant with a spindle-shaped root, several inches in length, which sends up each year a smooth, erect stem several feet in height. The leaves, which are alternate and petiolate, are divided almost to the base. The flowers are borne on erect, terminal, spike-like racemes. They are of a violet-blue color and quite large. The shape of the flower resembles that of a monk's hood or a friar's cowl, hence the variety of local names. In the year 1924, 33,031 pounds of aconite were imported.

CONSTITUENTS: Aconitine, crystalline alkaloid, $C_{34}H_{47}NO_{11}$, is the principal and most active one. Quite a list of associated principles have been enumerated and described in the literature. Whether or not they are definite chemical compounds, existing as such in the drug, is open to question. They are amorphous and do not appear to have been obtained in crystalline form. Among the amorphous alkaloids we find picraconitine which is said to be identical with benzoyl-aconine and isoaconitine; napelline may be a mixture of aconitine, benzoyl-aconine, aconine and certain decomposition products.

Properties and Uses: Aconite is a local anodyne and may be employed externally but should never be applied to abraded surfaces as it may be absorbed in dangerous quantity. It is also applied locally for pruritus, chilblains, odontalgia and periodontitis. When tasted, it produces a tingling sensation and numbness of the lips and tongue. When taken internally, aconite is a cardiac and circulatory sedative,

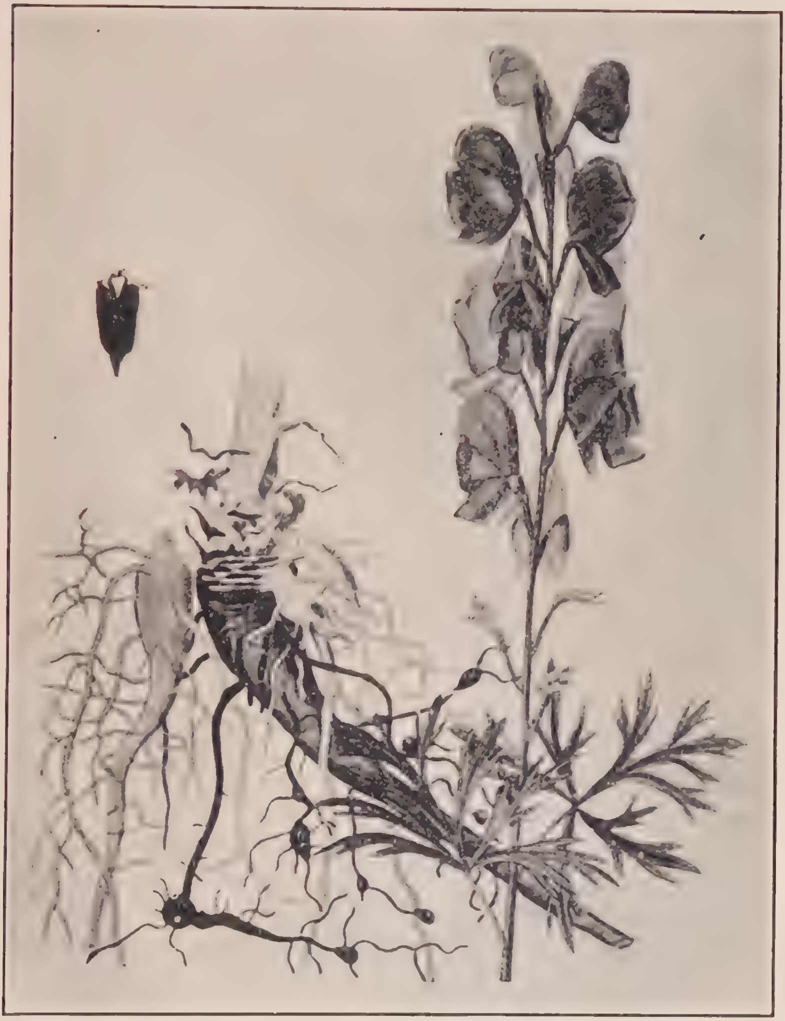


Fig. 37.—Aconite. (Courtesy of Parke, Davis & Company.)

the pulse being slowed due to direct depression of the heart muscle. The breathing also becomes slower, and the temperature is lowered. Thus it is used in sthenic or inflammatory fevers of the young and vigorous, to lower the temperature and correct the heart's action. Aconite is employed in a large number of conditions, such as laryngitis, pharyngitis, croup, quinsy, severe colds, bronchitis and tonsilitis; also, in measles, scarlet fever, erysipelas, acute meningitis, pericarditis, pleurisy and the first stages of pneumonia.

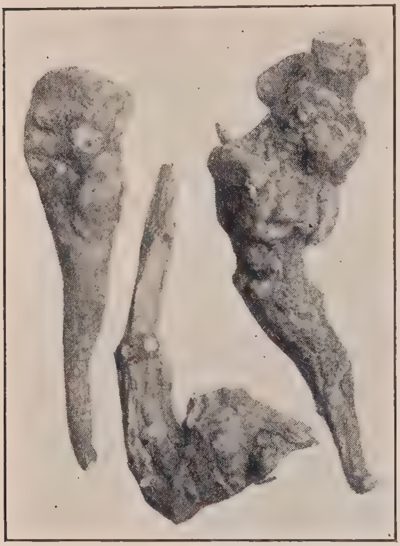


Fig. 38.—Aconite root.

Dose: 1 gr. (0.06 Gm.).

Official Preparation:

U.S.P. X.

Tincture of Aconite, 10 m. (0.6 cc.).

HYDRASTIS

(hī-drăs′tĭs)

HYDRASTIS—U.S.P.

Synonyms: Golden-seal; Yellow-root; Yellow puccoon; Orange-root; Indian dye; Indian turmeric; Yellow-eye; Jaundice root.

Source: Hydrastis canadensis Linné (Fam. Ranunculaceæ).

Etymology: Hydrastis from the Gr. "hydor," *water*, and "drao," *to act*, referring to the fact that it grows in moist places; or possibly to the active nature of the juice.

Canadensis refers, of course, to its habitat.

The name *"golden-seal"* was given because of the seal-like scar which occurs on the upper side of the rhizome.

Part Used: The rhizome and roots, which are required to assay not less than 2.5 per cent of ether-soluble alkaloids.

Description and Physical Properties: *Unground Hydrastis:* Rhizome subcylindrical, flexuous, from 1 to 5 cm. in length and from 2 to 10 mm. in thickness; more or less annulate and wrinkled longitudinally; yellowish brown to dark grayish brown; marked by numerous stem scars or occasional stem- or leaf-bases and numerous roots, frequently broken, leaving circular yellowish scars or short protuberances; fracture short and waxy; internally deep yellow or greenish yellow; odor distinctive; taste bitter.

Roots numerous, filiform, up to 35 cm. in length and 1 mm. in diameter; yellowish; brittle; curved, twisted and matted together or broken into pieces.

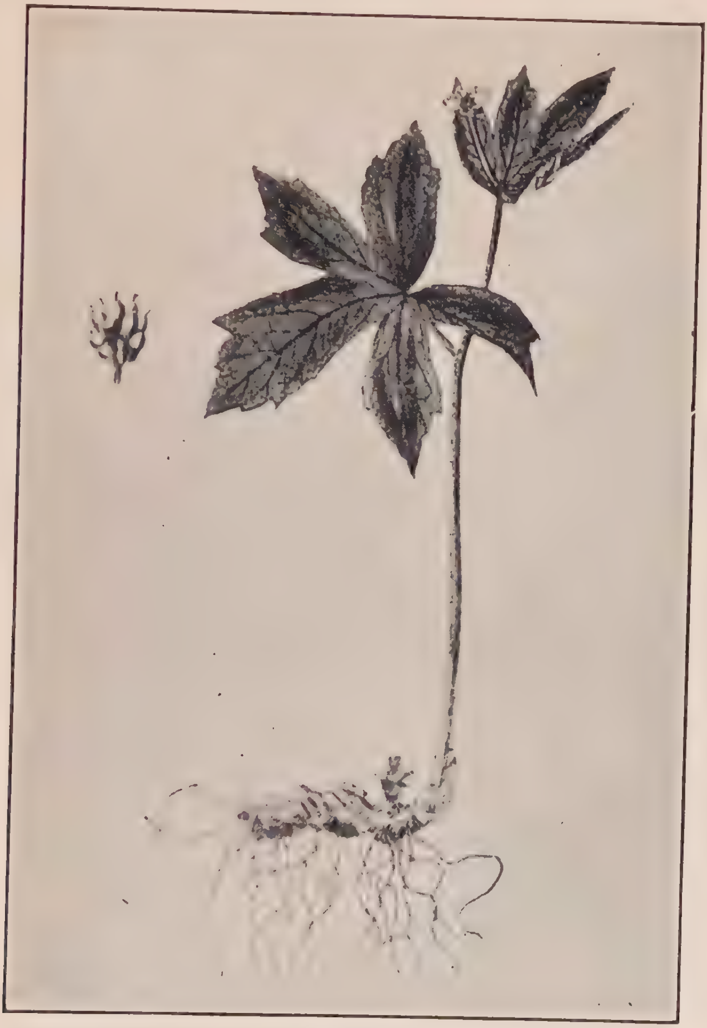


FIG. 39.—Hydrastis. (Courtesy of Parke, Davis & Company.)

HABITAT: North America.

DISCUSSION: This is a perennial, herbaceous plant which originally grew abundantly in the moist woodlands and mountain ravines of Canada and the eastern portion of the United States. It has practically become extinct, however, except in the Ohio River Valley, the reason being the high price which led to its ruthless extinction from its native haunts.

Hydrastis has a yellow, fleshy rhizome and an erect, simple stem about 1 foot in height. There are but two leaves, one at the top of the stem and the other a short distance below. From the base of the upper leaf arises a peduncle bearing a solitary, white, rose-colored or purple flower. The fruit is a red, or purple berry the size of a raspberry and containing many seeds. The plant originally grew in abundance in many parts of the United States, but especially in Ohio, Indiana, West Virginia and Kentucky.

Hydrastis was employed very early by the Cherokee Indians, both as a domestic remedy and as a dye; but although they revealed its medicinal value to the early settlers, it did not attract medical attention until about 1798 when the Eclectics began using it. In a short time it became one of our most important drugs. Mixed with indigo, it forms a beautiful green which may be used to color cotton, wool or silk.

CONSTITUENTS: Hydrastine, $C_{21}H_{21}NO_6$; berberine, $C_{20}H_{18}O_4N \cdot OH$; canadine, $C_{20}H_{21}NO_4$.

Until about 40 years ago a mixture of berberine and hydrastine was sold under the name of "hydrastine." At about that time (1886) it was demonstrated that this supposedly single alkaloid consisted in reality of a mixture of two, the yellow color of the product being due to the berberine. When it was learned that hydrastine was the more important of the two alkaloids it was named "hydrastine, white alkaloid" after the drug from which it is obtained and to distinguish it from the mixture formerly offered under the name "hydrastine."

NOTE: The natural alkaloid, hydrastine, must not be confused with the artificial one, hydrastinine. The latter is made synthetically from hydrastine, 10 Gm.; nitric acid, sp. gr. 1.3, 50 cc.; water 25 cc. Heat to 50°–60° C. until no precipitate forms upon the addition of ammonia. The product of this reaction is supersaturated with KOH, dried and crystallized.

The use of this artificial alkaloid in general is similar to that of hydrastis and hydrastine except that it causes greater arterial tension and more prolonged increase of blood pressure than the former.

PROPERTIES AND USES: Hydrastis is a bitter tonic, increases the appetite and is of value in chronic gastro-intestinal and other catarrhs. Thus it is serviceable in the treatment of catarrhs of the mucous membranes of the stomach, nose, duodenum, uterus and appendages, vagina and bladder and is also used as an injection in gonorrhœa, gleet, leucorrhœa and otorrhœa; as a spray in nasal catarrh, pharyngitis and tonsilitis. Both hydrastis and its alkaloids enter into many pharmaceutical specialties for physicians' use.

Dose: 30 gr. (2 Gm.).

Official Preparation: U.S.P. X.

Fluidextract of Hydrastis, 30 m. (2 cc.).

CIMICIFUGA

(sĭm′ĭ-sĭf′ŭ-gȧ)

CIMICIFUGA—U.S.P.

Synonyms: Black cohosh; Black Snakeroot; Rattle-top; Bugbane; Bugwort; Macrotys; Squawroot.

Source: Cimicifuga racemosa (Linné) Nuttall (Fam. Ranunculaceæ).

Etymology: Cimicifuga from the Lat. "cimex," *bedbug*, and "fugare," *to drive away*. The genus was so named from the fact that Cimicifuga fœtida was used in Siberia for that purpose.

Racemosa from the Lat. "racemosus," *full of racemes*, referring to the character of the flowers.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Cimicifuga:* Rhizome more or less branching, from 2 to 15 cm. in length and from 1 to 2.5 cm. in thickness; externally dark brown, slightly annulate, the upper surface with numerous hard, erect, somewhat curved branches having deep, cup-shaped, radiating scars; lower and lateral surfaces marked by numerous root scars and occasional short roots; fracture horny; internally dark brown and waxy or whitish and mealy; bark thin, wood distinctly radiate and about the same thickness as the pith; odor slight; taste bitter and acrid. Roots nearly cylindrical or obtusely quadrangular from 3 to 12 cm. in length and from 1 to 3 mm. in thickness, externally dark brown and longitudinally wrinkled; fracture short; internally, cortex thin and dark brown, wood yellowish or light-brown, 4- to 6-rayed.

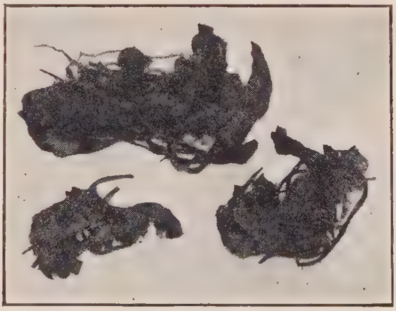


Fig. 40.—Cimicifuga.

Habitat: United States and Canada.

Discussion: This is a perennial, herbaceous plant, growing from 4 to 8 feet in height, the main stalk, as well as the branches, terminating in long racemes of white flowers. The fruit is an ovoid capsule containing many flat seeds. The plant grows abundantly in the shady woodlands from Canada to Florida.

Constituents: Resin; cimicifugin, a resinoid; tannin.

Properties and Uses: Cimicifuga is emmenagogue, stimulating and contracting the uterus and increasing the menstrual flow. It slows the rate of the heartbeat, and is recommended in cases of neuralgia, especially of the ovaries as well as for amenorrhœa and tenderness of the uterus. It is used in both chronic and sub-acute bronchitis and rheumatism.

Dose: 15 gr. (1 Gm.).

Official Preparation: U.S.P. X.

Fluidextract of Cimicifuga, 15 m. (1 cc.).

COPTIS

(kŏp′tĭs)

COPTIS—N.F.

Synonyms: Goldthread; Canker-root.

Source: Coptis trifolia (Linné) Salisbury (Fam. Ranunculaceæ).

Etymology: Coptis from the Gr. "koptein," *to cut*, referring to the appearance of the compound leaves.

Trifolia from the Gr. "tri," *three*, and the Lat. "folium," *leaf*, i.e., having three leaflets.

Goldthread, in allusion to the roots, which are very fine (thread-like) and of a golden-yellow color.

Part Used: The dried plant.

Description and Physical Properties: *Unground Coptis:* In loose, matted masses consisting of long, much-branched rhizomes and small roots, together with the leaves; rhizomes orange or golden yellow; leaves evergreen, long and slenderly petioled, trifoliate, the segments broadly obovate-cuneate, crenately lobed and toothed with sharp-pointed teeth, prominently veined, smooth, coriaceous, dark green and shining but often drying to a dull brownish hue; flowers, if present, small, solitary, terminating slender scapes; sepals 5 to 7, oblong, obtuse, deciduous; petals 5 to 6, pale yellow, small, club-shaped; stamens numerous. Odor faint; taste purely bitter without astringency.

Habitat: Northeastern United States, Canada.

Discussion: Coptis is a small evergreen plant growing from 4 to 6 inches in height. It frequents the dark, shady woods of the above-stated regions, especially where considerable moisture is present. The rhizomes (commonly called the "*roots*" on account of their length and small, thread-like diameter) are golden yellow in color and occur in matted masses. The leaves are trifoliate and occur on long, slender petioles. The flowers are small and white and are followed in fruit by beaked follicles containing little black seeds.

Constituents: Berberine; coptine (probably identical with hydrastine).

Properties and Uses: Coptis shares the general properties of the berberine-bearing drugs, but is principally employed in the form of an infusion or decoction for ulcerated mouth and as a gargle for tonsilitis and simple sore throat.

Dose: 30 gr. (2 Gm.).

Official Preparation: N.F. V.

Fluidextract of Coptis, 30 m. (2 cc.).

ADONIS

(ȧ-dō′nĭs)

ADONIS—N.F.

Synonyms: Pheasant's Eye; Bird's Eye; Ox-eye; False Hellebore.

Source: Adonis vernalis Linné (Fam. Ranunculaceæ).

Etymology: Adonis from the Gr. "Adonis." In classical mythology Adonis was described as a beautiful youth, beloved by Aphrodite. He was slain by a wild boar (in later versions represented as sent by the jealous Ares). From his blood sprang the plant, adonis. Aphrodite's grief was so boundless that the gods required him to spend only half of the year in Hades.

Vernalis, the Lat. for *vernal,* from "ver," *spring,* i.e., of or pertaining to spring; akin to the Gr. "ear," the Skt. "vasanta," and probably the Eng. "Easter," *east.*

Part Used: The dried, overground portion of the plant.

Description and Physical Properties: *Unground Adonis:* Glabrous, with the exception of the younger portions, which may be slightly grayish puberulent; stems from 15 to 50 cm. in length, longitudinally grooved, soft and weak, shining, simple or branched, the branches mostly from near the base and similar to the main stem, naked below, except for some scale-like leaf vestiges, densely leafy above; leaves from 2 to 4 cm. in length and two-thirds or more as broad, pinnately divided into several segments, the larger again divided, the ultimate segments being narrowly linear and acute; flowers terminal, yellow but usually drying to a cream color, from 3 to 6 cm. in breadth; sepals five, green or grayish puberulent, more than half the length of the petals, oblong, obtuse, finely nerved; petals from five to twenty, oblong, obtuse, finely nerved; stamens indefinite; pistils numerous, in fruit forming an ovoid, obtuse, dense head of ovoid achenes, which are tipped with the very small, persistent styles. Odor faint; taste bitterish, slightly acrid.

Habitat: Northern Europe, Asia.

Discussion: Adonis vernalis is a perennial, herbaceous plant growing from 6 to 10 inches in height, each stem terminating in a bright-yellow flower. It should be collected when in full bloom as at that season of the year the active principles are at their height.

Constituents: Adonidin (adonin?), a very bitter glucoside; aconitic acid.

Properties and Uses: Adonis resembles digitalis somewhat in its effect upon the circulation. It is also diuretic. It is therefore employed in the place of digitalis in cases of cardiac failure and in cardiac dropsy. It is inferior to digitalis and caffeine. It slows the rate of the heartbeat, increasing its force, resulting in an increased blood pressure.

Dose: 2 gr. (0.125 Gm.).

Official Preparation: N.F. V.

Fluidextract of Adonis, 2 m. (0.125 cc.).

PULSATILLA

(pŭl′sȧ-tĭl-ȧ)

PULSATILLA—N.F.

Synonyms: Pasque Flower; Meadow Anemone.

Source: Pulsatilla vulgaris (Linné) Miller, Pulsatilla pratensis (Linné) Miller, or Pulsatilla patens (Linné) Miller (Fam. Ranunculaceæ).

Etymology: Vulgaris from the Lat. "vulgus," *the multitude, the common people*, i.e., the common or usual kind.

Patens the Lat. for *open*, from "patere," *to be open*, from the Gr. "patone," *a kind of flat dish*, referring to the shape of the flower.

Pasque is the old French name for "*Easter*," from the Heb. "pasakh," *to pass over*, i.e., the Passover, the feast of Easter, referring to its early appearance.

Part Used: The dried herb.

Description and Physical Properties: *Unground Pulsatilla:* Leaves and flowering scapes matted, silky-villous, basal leaves with petioles up to 30 cm. in length, the latter hollow, often purplish in color, the blades twice or thrice deeply three- or four-parted or pinnately cleft, the lobes linear and acute, the base of the petiole more hairy than above and frequently attached to the short rootstock; flowering scapes up to 30 cm. in length, solid in the lower portion and hollow in the upper part, with sessile, involucral leaves near the flower, occasionally with remains of the dull purple, hairy sepals and the dense-woolly, plumose-tailed achenes. Nearly odorless; taste very acrid.

Habitat: Europe, England, America, Siberia.

Discussion: These are small, perennial herbs with erect stems, each bearing a large, terminal, bell-shaped flower of a delicate purplish color. They appear early in the spring and should be collected soon after flowering. The stems are covered with soft, silky hairs. They have apetalous flowers but six petaloid sepals.

Constituents: Anemonin, $C_{10}H_8O_4$ (anemone or pulsatilla camphor), the principal constituent, is very volatile; therefore, the drug should not be kept longer than one year.

Properties and Uses: Pulsatilla is anodyne, sedative and expectorant; large doses are irritant, emetic and poisonous. It is used for its soothing action in whooping-cough, asthma and bronchitis. It is also emmenagogue and seems to exert a special action on the genital organs. Thus it is employed in dysmenorrhœa, orchitis and epididymitis.

Dose: 5 gr. (0.3 Gm.).

Official Preparation: N.F. V.

Tincture of Pulsatilla, 30 m. (2 cc.).

CHAPTER XXVII

MONIMIACEÆ

(mȯ̆-nĭm′ĭ-ā′sė̆-ē)

MONIMIACEÆ

This is a small family of aromatic trees and shrubs comprising 25 genera and about 150 species. They have opposite leaves and small, cymose flowers, the fruit consisting of small, 1-seeded drupes.

BOLDUS

(bŏl′dŭs)

BOLDO—N.F.

Synonym: Boldo Leaves.

Source: Boldu Boldus Molina (Lyons) (Fam. Monimiaceæ).

Etymology: Boldus and Boldu come through the Spanish from the native Chilean "boldo," the name of the plant.

Molina, named for Juan Ignazio Molina, a Chilean naturalist.

Monimiaceæ, named for Monime, the wife of Mithridates, after whom an allied genus had been named.

Part Used: The dried leaf.

Description and Physical Properties: *Unground Boldo:* Broadly ovate or oval, 3 to 7 cm. long and 1 to 4 cm. wide, the base varying from rounded to very slightly indented, the apex rounded or slightly notched, the margin entire and sharply revolute; thick, coriaceous, rigid and brittle; pale green to brownish green, papillose, roughened on both surfaces, the principal veins coarsely reticulate, impressed above, sharply prominent underneath; the petiole stout and rigid, 1 to 5 mm. long, reticulate. Odor peculiar, when crushed very strong, disagreeable, and somewhat like that of oil of chenopodium; taste bitter, warm and pungent, camphoraceous and slightly terebinthinate.

Habitat: Chile.

Discussion: This plant is a large evergreen shrub indigenous to the coast-region of Chile. The bark contains a large percentage of tannin which renders it useful for tanning leather, while the wood is much used in charcoal-making. The leaf is from 1 to 2 inches in length, broad, entire margin and coriaceous, and has a peculiar aromatic odor.

Constituents: Volatile oil, 2 per cent; resin; tannin; boldine, an alkaloid.

Properties and Uses: Because of the volatile oil and resin present, boldus leaves are sedative and hypnotic. They are administered in the treatment of mania and various forms of nervous excitement. Both of these constituents are eliminated to a considerable extent by the kidneys, rendering it a useful remedy in the treatment of catarrhal conditions of the genito-urinary tract. Applied locally, boldine is said to be an efficient anesthetic.

Dose: 8 gr. (0.5 Gm.).

Official Preparation: N.F. V.

Fluidextract of Boldo, 8 m. (0.5 cc.).

CHAPTER XXVIII

PAPAVERACEÆ

(pȧ-păv′ẽr-ā′sė̄-ē)

POPPY FAMILY

This family consists of herbs and shrubs with milky juice and regular or irregular flowers. It numbers 26 genera and about 200 species, found, for the most part in the North Temperate Zone. The flowers are solitary and stand on the ends of long peduncles. The sepals drop when the flower opens. The fruit is a many-seeded capsule which dehisces by means of pores.

SANGUINARIA

săn′gwĭ-nā′rĭ-ȧ)

SANGUINARIA—N.F.

Synonyms: Bloodroot; Redroot; Red puccoon; Tetterwort; Bloodwort; Indian paint; Sweet slumber.

Source: Sanguinaria canadensis Linné (Fam. Papaveraceæ).

Etymology: Sanguinaria from the Lat. "sanguis," *blood,* because all parts of the plant contain a blood-red juice.

Papaveraceæ from the Lat. "papaver," the classic name of the poppy, from "papa," *pap* or *thick milk*, referring to the juice which was once used for children to produce sleep.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Sanguinaria:* Of horizontal growth, occasionally branching, more or less cylindrical, somewhat flattened, from 2 to 7 cm. in length and from 5 to 15 mm. in diameter; externally dark brown, slightly annulate, with a few stem scars on the upper surface and numerous root scars or more or less broken filiform roots on the lower surface; fracture short, most of the rhizomes showing a brownish red internal color, somewhat waxy and with numerous small, circular, yellowish fibro-vascular bundles within about 1 mm. of the epidermis and a very large pith. Odor slight; taste persistently acrid and bitter.

Habitat: Canada and northern United States.

Discussion: This is one of the earliest and most beautiful of the wild flowers. It grows in rich, shady places in many localities of the

United States. The rhizome is about the thickness of a pencil and 2 or 3 inches in length. The flowers are cup-shaped, about an inch in diameter and of a pinkish color. The juice was much used by the American Indians for staining red.

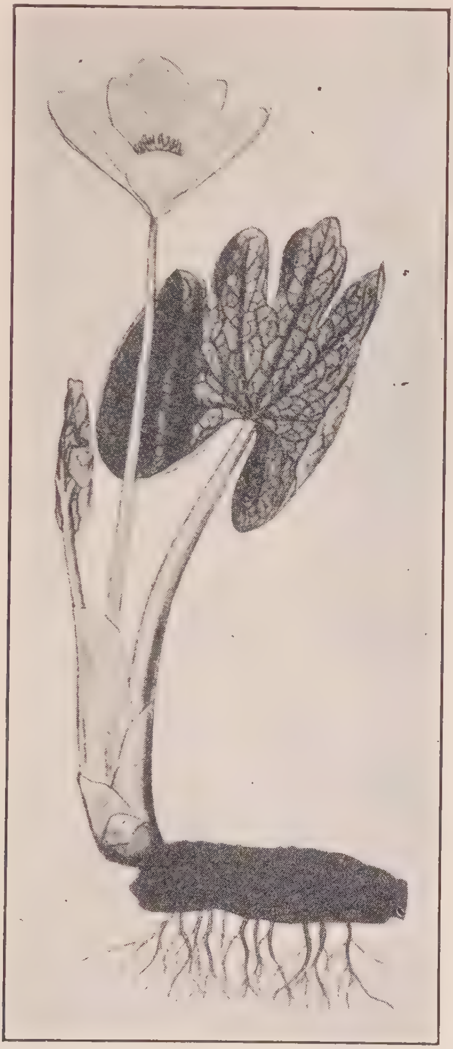


FIG. 41.—Sanguinaria, whole plant. (Courtesy of Parke, Davis & Company.)

CONSTITUENTS: Sanguinarine; chelerythrine; protopine; beta- and gamma-homochelidonine. The salts of sanguinarine are blood-red in color, while those of chelerythrine are lemon-yellow.

Properties and Uses: Sanguinaria is a stimulating expectorant and a systemic emetic.

It has been used in expectorant mixtures for coughs, and as an emetic in croup, but it is said to be too irritant for the latter purpose. Some practitioners recommend it as an hepatic stimulant and in the treatment of gastro-intestinal catarrh and jaundice.

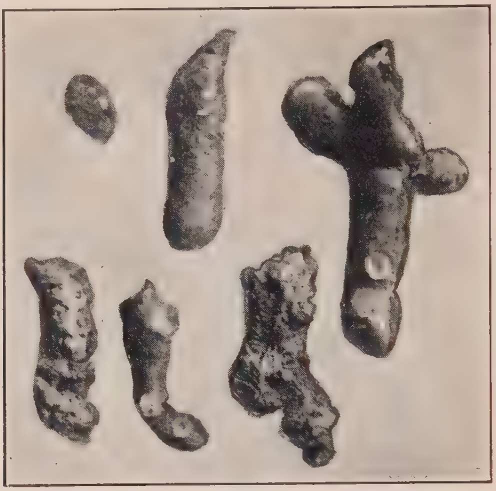


Fig. 42.—Sanguinaria, rhizomes only.

Dose: 2 gr. (0.125 Gm.).

Official Preparations: N.F. V.

Fluidextract of Sanguinaria, 1½ m. (0.1 cc.).
Compound Syrup of White Pine, 1 fl. dr. (4 cc.).
Compound Syrup of White Pine with Morphine, 30 m. (2 cc.).
Tincture of Sanguinaria, 15 m. (1 cc.).

OPIUM

(ō′pĭ-ŭm)

OPIUM—U.S.P.

Synonyms: Gum opium; Crude opium. The plant is known as the Opium poppy; White poppy; Maw-seed poppy; Cheese bowl; Marble flower.

Source: Papaver somniferum Linné or its var. album De Candolle (Fam. Papaveraceæ).

ETYMOLOGY: Opium from the Gr. "opion," the dim. of "opos," *poppy juice*, from "abe-oon," the Persian name for opium.

Papaver, the classic name of the poppy from "papa," *pap* or *thick milk*, referring to the juice which was once used for children to produce sleep.

Somniferum, from the Lat. "somnus," *sleep*, and "ferre," *to bring*, referring to its somnifacient property.

PART USED: The air-dried milky exudation obtained by incising the unripe capsules. It is required by the pharmacopœia to yield not less than 9.5 per cent of anhydrous morphine.

DESCRIPTION AND PHYSICAL PROPERTIES: In more or less rounded, somewhat flattened, masses, usually about 8 to 15 cm. in diameter; externally dark brown, covered with fragments of poppy leaves and at times with fruits of a species of rumex adhering from the packing; more or less plastic when fresh, becoming hard and brittle or tough on keeping; internally dark brown, interspersed with lighter areas, somewhat lustrous; odor characteristic, narcotic; taste very bitter, characteristic.

HABITAT: Asia Minor, Persia, China, India.

DISCUSSION: There are several varieties of Papaver somniferum, the two most important ones being the white and the black poppy, so named from the color of the seeds. All are annual plants with large solitary, terminal flowers on long peduncles. In the white poppy the flowers are white or silver-gray in color, while in the so-called "*black*" poppy they may be white but are usually red or violet.

All parts of the plant contain a white, milky juice, but opium is obtained only from the juice of the capsule. The poppy is cultivated, more or less extensively, in all of the countries named, for the production of opium. A few days after the falling of the petals, the pistil or "poppy head," which is 1 or 2 inches in diameter, is ready for incision. This pistil is a true capsule composed of many carpels and containing many seeds. The capsule is one-celled, but has many partitions extending from the outer wall a short distance towards the center. It is upon these partitions that the seeds are borne. The dehiscence of the capsule is peculiar, being in the nature of small holes or pores through the wall of the capsule just beneath the crown.

The latex tubes are complex, opening into one another, so that it is not necessary to incise them all. In incising the capsules, skill is required in order to avoid cutting clear through the pericarp, since in that case some of the juice would flow inside of the capsule and be lost, besides contaminating the seeds. These incisions are made with specially constructed knives having three or four parallel blades. The incising is usually done in the afternoon, and by the following morning the juice is concreted sufficiently to allow of its being scraped off with a knife.

The opium gatherer carries a poppy leaf in one hand, and to this he transfers the opium as he removes it from the capsules. When he has collected a sufficient amount to make a lump the size of a walnut, he wraps it in poppy leaves and places it in the shade to dry. These lumps are sold to the opium merchant, who usually works the soft drug into lumps or cakes of a larger size and again wraps them in poppy

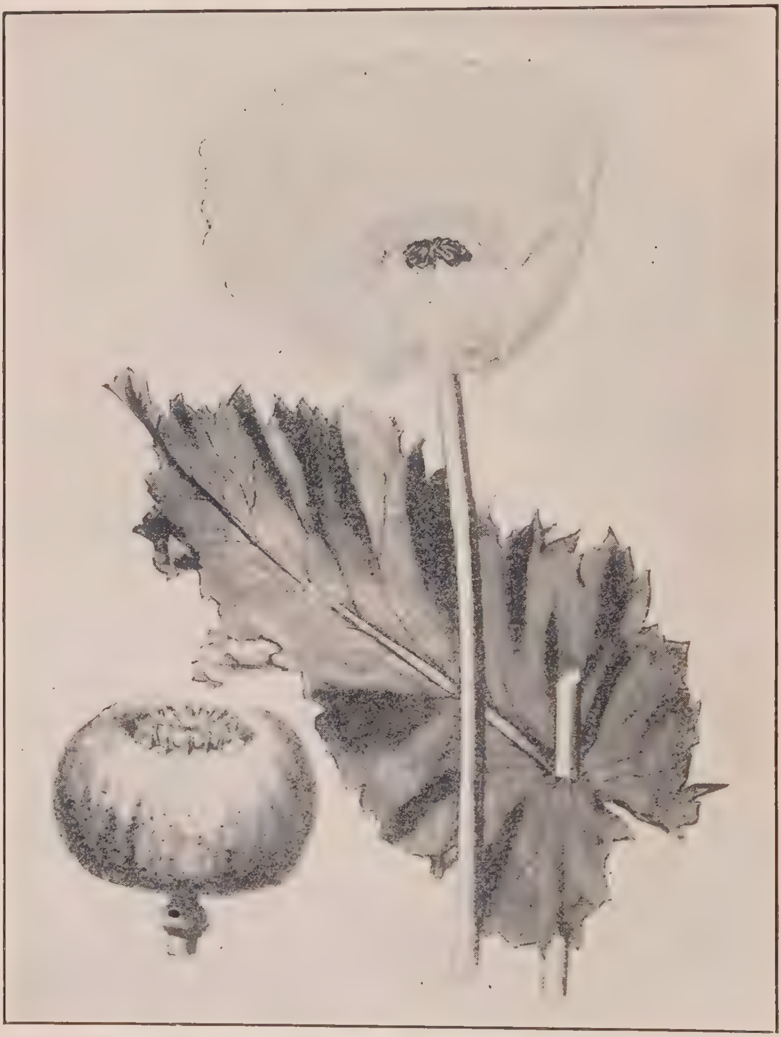


FIG. 43.—Papaver somniferum, showing leaf, flower and full-grown capsule. (Courtesy of Parke, Davis & Company.)

leaves to retard as much as possible the loss of weight by evaporation.

Poppy seeds, known in the market as "*maw seeds*," are expressed for the recovery of the fixed oil which is present to the extent of about 50 per cent. This oil is used in Europe and Asia as a salad dressing as well as for various commercial purposes. The expressed cake makes a good cattle food since it contains about 10 per cent of protein matter. The dried capsules were official in the U.S.P. from 1840 to 1880 and were used to make a soothing syrup and for preparing hot fomentations to be applied to sprains, etc.

Attempts have been made to raise opium in Europe and America and, indeed, a splendid quality of opium has been produced; but the high cost of labor in America makes its production on a paying basis an impossibility. In 1924, 64,041 pounds of crude opium were imported.

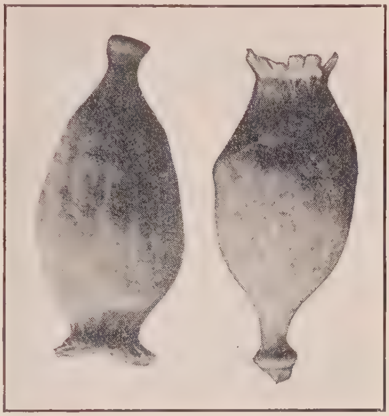


Fig. 44.—Poppy capsules, elongated form.

Constituents: Opium contains a large number of alkaloids, the more important ones being morphine and codeine which occur in combination with sulphuric and meconic acids. Other alkaloids present are narcotine, narceine, thebaine, papaverine, codamine, cryptopine, gnoscopine, hydrocotarnine, lanthopine, laudanine, laudanosine, meconidine, oxynarcotine, papaveramine, protopine, pseudomorphine, rhœadine and tritopine.

A number of derived products are manufactured from the alkaloids of opium, e.g., (*a*) dionin, which is ethylmorphine hydrochloride, (*b*) apomorphine, prepared from morphine or codeine by a dehydration process in which heat and hydrochloric acid are employed, (*c*) heroine, which is diacetylmorphine.

Properties and Uses: Largely on account of the morphine present, opium allays pain and excitement and allows the patient to rest. It is especially serviceable in those cases where sleeplessness is caused by pain. This anodyne and sedative action indicates its use in delirium tremens, acute mania, peritonitis and meningitis. It is also used in numerous other conditions such as hysteria, renal and hepatic colic (caused by calculi) and other conditions attended with extreme pain such as fractures, dislocations, etc. Opium is used for its antispasmodic effect in many conditions where spasm is a prominent symptom, such as asthma, epilepsy, bronchitis (to allay the cough) and the dry hacking cough of consumption. Codeine is replacing morphine for these purposes.

Opium has a strong action in checking profuse secretions and is used for this effect in diarrhœa, dysentery, diabetes and cholera morbus. While morphine is the principal alkaloid of opium and is responsible for much of its action in the conditions enumerated, it is assisted by the other alkaloids present. Thus codeine is hypnotic and antispasmodic, the latter especially in bronchial and tubercular coughs. Narcotine is hypnotic, and narceine is hypnotic with less of the general after-effects, i.e., headache and constipation.

Opium and morphine should be employed with the greatest of caution on account of their habit-forming tendencies; but in cases of cancer, advanced tuberculosis and other incurable conditions, the ease and comfort of the patient should be of first consideration. Young children are very susceptible to the narcotic action of opiates and should be given correspondingly smaller doses. Women are usually more susceptible to the action of opiates than men, while certain of the lower animals, such as chickens, ducks and pigeons, are almost immune.

DOSE: 1 gr. (0.06 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Compound Mixture of Glycyrrhiza, 1 fl. dr. (4 cc.).
Granulated Opium, 1 gr. (0.06 Gm.).
Powder of Ipecac and Opium, 5 gr. (0.3 Gm.).
Tincture of Opium, 10 m. (0.6 cc.).
Camphorated Tincture of Opium, 1 fl. dr. (4 cc.).

CHAPTER XXIX

FUMARIACEÆ

(fū̇-mā′rĭ-ā′sĕ̇-ē)

FUMITORY FAMILY

This family consists of delicate herbs and a few shrubs. The leaves are usually compound and the flowers, which have two petals, are irregular. The fruits are 1-celled capsules containing one or more seeds.

CORYDALIS

(kō̇-rĭd′ȧ-lĭs)

CORYDALIS—N.F.

Synonyms: Squirrel Corn; Turkey Corn; Wild Hyacinth.

Source: Dicentra canadensis (Goldie) Walp, or Dicentra Cucullaria (Linné) Bernh (Fam. Fumariaceæ).

Etymology: Corydalis from the Gr. "korydallis," *a crested lark,* from "korus," *a helmet,* referring to the numerous scapes.

Dicentra from the Gr. "di," *two,* and "kentron," *a spur,* referring to the spur-like corollas.

Cucullaria from the Lat. "cucullatus," *hooded,* or *crested,* from "cucullus," *a cap* or *hood,* referring to the shape of the flowers which have two petals so arranged as to give the appearance of a cap or hood.

Part Used: The dried tubers.

Description and Physical Properties: *Unground Corydalis:* Tubers of *D. canadensis* spheroidal, frequently vertically depressed, one surface more or less concave, up to 15 mm. in diameter; usually single, rarely two or more in a cluster; externally, minutely pitted or nearly smooth, grayish brown, grayish black, or amber-colored and more or less translucent; one of the flattened surfaces with a triangular scar from detached roots, the other usually with remains of the slender rhizome; fracture, hard and horny, exhibiting a yellowish, waxy interior, or somewhat tough and granular, exhibiting a yellowish white interior.

Tubers of *D. Cucullaria* ovoid or triangular-ovoid, up to 12 mm. long; the larger distinctly concave on one surface, with a scar at the apex from the detached petiole, and usually attached to the short rootstock in clusters of three; the smaller grains usually separated from the rootstock, with an acute apex and a scar at the base; externally, yellowish, or grayish brown, usually translucent; fracture hard and horny, exhibiting a grayish, waxy interior, or granular and tough, exhibiting a whitish interior. Nearly odorless; taste slightly bitter.

HABITAT: Eastern United States and Canada.

DISCUSSION: This is a low, stemless, perennial, herbaceous plant and one of the most beautiful of our early wild flowers. It produces several scapes, each bearing a number of greenish-white flowers tinged with purple (*D. canadensis*) or yellow (*D. Cucullaria*). The leaves are ternately-compound and dissected. The flowers occur in racemes and have heart-shaped and spurred corollas. The small, tawny-yellow tubers are frequently vertically depressed, the flattened surface being somewhat concave.

CONSTITUENTS: Corydaline ($C_{22}H_{27}NO_4$); some nine other alkaloids; resin; fumaric acid; bitter principle.

PROPERTIES AND USES: Corydalis is tonic, alterative and diuretic and is employed in chronic cutaneous and syphilitic affections.

DOSE: 10 gr. (0.6 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Elixir of Corydalis, 1 fl. dr. (4 cc.).
Fluidextract of Corydalis, 10 m. (0.65 cc.).
Compound Fluidextract of Stillingia, 30 m. (2 cc.).
Compound Syrup of Stillingia, 1 fl. dr. (4 cc.).

CHAPTER XXX

CRUCIFERÆ

(kro͞o-sĭf'ĕr-ē')

MUSTARD FAMILY

This is a large family, numbering about 185 genera and 1500 species, of wide distribution. They are characterized by their colorless secretory cells containing pungent, watery juices. They are easily distinguished by the flowers which have four sepals and four petals, the upper part generally spreading above the calyx in the form of a Maltese cross. Myrosin-secreting cells occur in most species. On the whole, it is a very important family since it furnishes the turnip, cauliflower, cabbage, mustard, radish and water cress.

SINAPIS ALBA

(sĭ-nā'pĭs ăl'bȧ)

WHITE MUSTARD—U.S.P. IX

Synonym: Yellow mustard.

Source: Sinapis alba Linné (Fam. Cruciferæ).

Etymology: Sinapis from the Gr. "sinapi," a more vigorous form of expression than "napi," *mustard*, from the Celtic "nap," *turnip*, referring to its pungency.

Alba from the Lat. "albus," *white*, referring to the color of the seeds.

Cruciferæ from the Lat. "crux, crucis," a *cross*, and "ferens," *bearing*, referring to the shape of the flowers which are in the form of a Maltese cross.

Mustard from the Lat. "mustum," *must*, referring to the ancient custom of pounding the seeds with vinegar, then known as "*must*."

Part Used: The ripe seeds.

Description and Physical Properties: Sub-globular, from 1.5 to 2.5 mm. in diameter; testa yellowish, nearly smooth; embryo yellowish, oily, with two large cotyledons; inodorous, taste mildly pungent, acrid.

HABITAT: Europe and Asia. Cultivated in all temperate climates.

DISCUSSION: This is an annual garden plant with small, yellow flowers occurring in racemes. It has a very long history since it was known to the Greeks and Romans several centuries before the dawn of the Christian Era. No distinction is made in the governmental statistics on importation between the *white* and *black* mustard. The total of both kinds imported in 1924 amounted to 14,889,278 pounds.

CONSTITUENTS: The seeds contain about 25 per cent of a bland fixed oil. They also contain a crystalline, sulphur compound known as "*sinalbin*" ($C_{30}H_{44}N_2S_2O_{16}$) and the ferment "*myrosin*." Sinalbin is a glucoside, and in the presence of water (*hot* water destroys the ferment) is acted upon by the ferment which decomposes it with the production of acrinyl-sulpho-cyanide ($C_7H_7O.NCS$), sinapine sulphate ($C_{16}H_{23}NO_5 \cdot H_2SO_4$) and glucose ($C_6H_{12}O_6$). The acrinyl-sulpho-cyanide is a very active principle, oily, non-volatile and insoluble in cold water. It may be extracted with ether from the crushed seeds after the action of the ferment is completed.

PROPERTIES AND USES: Mustard is stimulating and irritant, whether taken internally or applied externally. Thus if it is taken in small quantity, its action will be stimulant, carminative and condiment. It dilates the blood vessels of the stomach, stimulates the sensory nerves and produces a sensation of warmth which reflexly stimulates the whole body. If, however, the dose be too large, its action on the stomach will cause emesis due to a reflex stimulation on the vomiting center in the medulla. These actions indicate its use, i.e., a small dose as a condiment and carminative, and large doses as an emetic in hiccough, delirium tremens, acute indigestion and narcotic poisoning.

Externally mustard is applied in the form of a poultice or plaster for its stimulant and counter-irritant effect in neuralgia, gastralgia, inflammation of the throat and chest, persistent vomiting and rheumatism; also in the form of a hot foot bath for amenorrhœa and dysmenorrhœa. The hot foot bath accompanied by cathartic remedies is one of the forms of treatment to break up a cold or the "grippe," the patient remaining in bed.

(a) SINAPIS NIGRA

(sĭ-nā′pĭs nī′grȧ)

BLACK MUSTARD—U.S.P.

(b) OLEUM SINAPIS VOLATILE

(ō′lē-ŭm sĭ-nā′pĭs vŏl-ȧ-tĭl′ē)

VOLATILE OIL OF MUSTARD—U.S.P.

Synonyms: (a) Brown mustard.
(b) Mustard oil.

Source: Brassica nigra (Linné) Koch and Brassica juncea (Linné) Cosson and varieties related to these species (Fam. Cruciferæ).

Etymology: Brassica from the Celtic "bresic," *cabbage*, referring to the odor which is similar to that of the cabbage.

Nigra from the Lat. "niger," *black*, referring to the color of the seeds.

Mustard from the Lat. "mustum," *must*, referring to the ancient custom of pounding the seeds with vinegar, then known as "*must*."

Part Used: (a) The ripe seeds.

(b) The volatile oil obtained by maceration with water and subsequent distillation of the dried ripe seed or prepared synthetically.

Description and Physical Properties: (a) *Unground Black Mustard:* Spheroidal or irregularly spheroidal, from 1 to 1.6 mm. in diameter; testa dark reddish brown, sometimes yellowish brown and with a grayish tinge, minutely pitted or reticulate; embryo greenish yellow or dark yellow, oily, with 2 large cotyledons; odor when dry, slight; on crushing and moistening, very irritating, strongly pungent, characteristic; taste strongly pungent, acrid.

(b) A colorless or pale yellow, strongly refractive liquid, having a very pungent, irritating odor, and an acrid taste.

Habitat: Europe and Asia. Cultivated in all temperate climates.

Discussion: This is an annual plant with a much divided stem growing from 3 to 4 feet in height. The small, yellow flowers stand closely upon peduncles at the upper part of the branches. The fruit is a pod containing several shiny, dark-reddish-brown seeds.

Constituents: (a) The seed—Like the white mustard, the black mustard seeds contain about 25 per cent of a bland fixed oil. In both cases the fixed oil is inodorous and non-drying. Black mustard also contains the ferment myrosin and a glucoside called "*sinigrin*" ($KC_{10}H_{18}NS_2O_{10}$). When the glucoside is decomposed by the ferment (in the presence of water) it yields allyl-iso-sulpho-cyanate (C_3H_5NCS) which is the volatile oil of mustard. From 0.5 to 1 per cent may be developed.

(*b*) Oil of mustard—Consists of not less than 93 per cent of allyl isothiocyanate, C_3H_5NCS.

PROPERTIES AND USES: The properties and uses of black mustard are the same as listed under the white mustard (see preceding drug). The oil generally is used externally only and is rubifacient, irritant or vesicating, depending upon the concentration and the length of time it is allowed to act.

DOSE: (*a*) Black mustard—For an emetic, 2½ dr. (10 Gm.).
(*b*) Mustard oil—⅛ m. (0.008 cc.).

OFFICIAL PREPARATION: U.S.P. X.
(*a*) Mustard Plaster.

CHAPTER XXXI

GUTTIFERÆ

(gŭ-tĭf′ẽr-ē)

GAMBOGE FAMILY

This family numbers about 400 species and consists of tropical trees and shrubs. The plants contain schizogenic resin canals and, upon being wounded, exude juices which harden to form gum-resins.

CAMBOGIA

(kăm-bō′jĭ-ȧ)

GAMBOGE—U.S.P.

Source: Garcinia Hanburyi Hooker filius (Fam. Guttiferæ).

Etymology: Cambogia and gamboge from "Cambodia," a French protectorate in Indo-China.

Garcinia, named in honor of Lauret Garcin a French botanist (d. 1752).

Guttiferæ from the Malayese "gutah," or the Javanese "getah," *a gum* or *balsam,* and the Lat. "ferre," *to bear,* i.e., contains a resinous juice or sap.

Part Used: The gum-resin which results from the hardening of the juice as it dries.

Description and Physical Properties: *Unground Gamboge:* Cylindrical pieces, frequently hollow at the center, from 2 to 5 cm. in diameter, up to 20 cm. in length, longitudinally striate, grayish orange brown; fracture brittle, conchoidal, presenting a smooth, rather dull, orange-red surface; odorless; taste acrid.

Habitat: Siam, French Indo-China and the adjacent islands.

Discussion: The tree yielding gamboge is confined to the islands and seacoast of the Gulf of Siam. It grows to a height of 40 or 50 feet and to a diameter of about 12 inches. The juice occurs in all parts of the tree, but is especially abundant in the inner bark. Whenever the tree is wounded the juice begins to flow and becomes encrusted about the wound in the form of drops or "*tears.*"

This method of collection is sometimes resorted to, but more often incisions are made through the inner bark and bamboo joints hung in such a manner as to receive the sap as it exudes. Trees are tapped only every other year and the yield averages about three or four bamboo joints full per tree.

As the juice dries in the bamboo joint, it contracts so that a considerable depression is formed at either end and, indeed, a cylindrical hole may be formed running through the entire length. The method of collection just described yields the best product. An inferior grade is obtained by collecting the juice in cocoanut shells or other open vessels into which more or less impurities are blown by the wind.

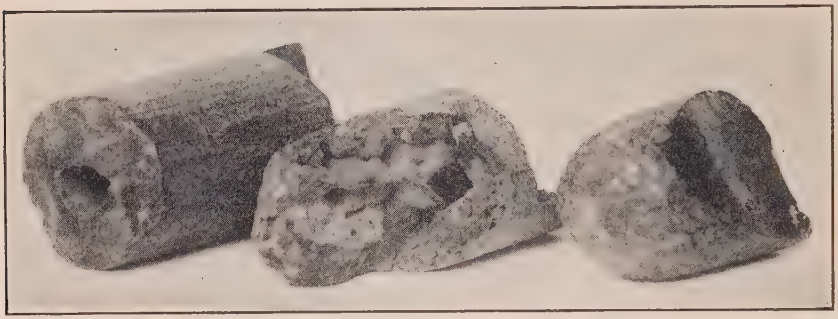


FIG. 45.—Gamboge.

CONSTITUENTS: Resin (cambogic acid), 66 to 80 per cent; gum, 16 to 25 per cent.

PROPERTIES AND USES: Gamboge is a drastic hydragogue cathartic. If administered in full doses, this action is accompanied by considerable nausea and griping. On that account, it is usually combined with other cathartics, such as calomel, jalap or potassium bitartrate in order that the dose of gamboge may be reduced and its action modified. It is used in the arts as a pigment, especially in water-color painting.

DOSE: 2 gr. (0.125 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Compound Pills of Mild Mercurous Chloride, 2 pills.

CHAPTER XXXII

STERCULIACEÆ

(stẽr-kū′lĭ-ā′sė̄-ē)

COLA FAMILY

This is chiefly a tropical family, numbering about 150 species and consisting of herbs, shrubs and trees, with simple, alternate leaves and small flowers. The plants have mucilage-secreting organs occurring as membranes, cavities or canals. Calcium oxalate crystals also occur, either as solitary crystals or in rosette aggregates.

(*a*) OLEUM THEOBROMATIS

(ō′lė-ŭm thē′ȯ-brō-mȧ′tĭs)

OIL OF THEOBROMA—U.S.P.

(*b*) CACAO PRÆPARATUM

(kȧ-kā′ō prė̄-pā-rā′tŭm)

COCOA—N.F.

Synonyms: (*a*) Cacao butter; Cocoa butter; Chocolate tree.

(*b*) Prepared Cacao.

Source: Theobroma Cacao Linné (Fam. Sterculiaceæ).

Etymology: Theobroma from the Gr. "theos," *god* and "broma," *food*, i.e., *the food of the gods*, referring to its delicious flavor.

Cacao from the native Mexican "kakahuati," the Aztec name of the tree.

Sterculiaceæ from the Lat. "Sterculius," the deity that presided over fertilization, from "stercus," *dung*, referring to the odor of the flowers.

Part Used: (*a*) The fat expressed from the roasted seeds.

(*b*) A powder prepared from the roasted, cured kernel of the ripe seed.

Description and Physical Properties: (*a*) A yellowish-white solid, having a faint, agreeable odor, and a bland, chocolate-like taste.

It is usually brittle at temperatures below 25° C.

Oil of Theobroma is slightly soluble in alcohol; soluble in boiling dehydrated alcohol; freely soluble in ether, chloroform, petroleum benzin, and in benzene.

(*b*) *Cocoa:* Brownish red; oil globules, protein grains and starch grains numerous, the latter, simple or compound and up to 0.012 mm. in diameter. Odor and taste chocolate-like; free from sweetness.

HABITAT: Mexico, West Indies, Brazil. Cultivated in many tropical regions, especially Central America.

DISCUSSION: This is a beautiful evergreen tree growing from 12 to 20 feet in height. It grows best in the shade and is largely cultivated on the haciendas of the countries named between the banana plants or other trees. It bears fruit and flowers simultaneously, throughout the year, although the production is greatest in the spring and fall. It belongs to that group of tropical plants known as "*cauliflorœ,*" meaning "*stem flowers,*" because of the peculiarity that both flowers and fruits may be found arising from any part of the trunk or branches. The fruit is an oblong capsule, some 6 or 8 inches in length, with a thick, tough rind enclosing a sweet, acid pulp in which are embedded as many as seventy almond-shaped seeds arranged in five longitudinal rows.

The flowers are very small and numerous. It is estimated that not more than one out of three thousand flowers mature. The yield per tree is about twenty or thirty fruits, or one and a half pounds of seeds per year. During the year 1924, 1,778,859 pounds of theobroma were imported.

The gathering of the fruit requires a great deal of skill and experience since the grade of the final product depends upon the stage of development of the fruit at the time of collection. The collector taps the fruit with a long bamboo or other pole and judges its ripeness by the sound produced. The fruits are opened; the seeds, which are white at this time, and some adhering pulp are removed and cleaned by washing, tramping and working on sieves. They are then subjected to a sweating or fermentation process which, with the subsequent drying, develops the rich brown color of chocolate, due to an oxidation of the tannic acid to cocoa red. The beans are roasted for the purpose of producing the fine flavor and aroma that we associate with chocolate. Following this the beans are crushed and their papery enveloping shell is blown out and collected for use as a cheap substitute for the preparation of a beverage having the flavor of chocolate but very inferior in quality. The crushed kernels or seeds are known as "*nibs.*" These are next reduced to a very fine powder, generally by crushing between hot rollers. This finely ground substance, molded in the form of cakes of various sizes, containing about 50 per cent of cacao butter, constitutes plain, pure, unsweetened, or "bitter" chocolate. In the confectionery trade it is known as chocolate liquor although in our climate it is a solid substance. It is this article that is used in covering bitter-sweet chocolates.

Sweet chocolate consists of the " liquor " with enough sugar to constitute not over 60 per cent of the whole. It should contain about 45 per cent of cacao butter and may have a small amount of flavor such as vanilla. Chocolate-coated candies are made by dipping the "centers" in slightly warm chocolate liquor and allowing them to cool. The figures on the upper surface are made by hand or with a bent wire of appropriate design.

Chocolate contains too much oil (cacao butter) to mix well with water for the preparation of a beverage; it is also too rich and therefore too difficult for many to digest. For these reasons, the finely ground chocolate is placed between hot plates and subjected to hydraulic pressure to remove about 60 to 70 per cent of its oil. This partially defatted, finely ground powder constitutes cocoa which is used for preparing the beverage of that name. Some commercial brands of cocoa contain alkali to render it more "soluble." While no cocoa is actually soluble, that treated with alkali forms an emulsion or suspension more readily with water than that which has not been so treated.

Milk chocolate, which has become very popular in recent years, consists of chocolate, milk powder, cacao butter, and powdered sugar with or without flavoring. Nuts are frequently incorporated.

CONSTITUENTS: Theobromine, from about 1 per cent to over 4 per cent, generally between 1 and 2 per cent. Caffeine is present in very small amount, up to about 0.2 per cent; cacao butter, an oil in the tropics but a solid with us, about 50 per cent. Theophylline appears not to be a constituent.

PROPERTIES AND USES: Chocolate—Nutrient because of its oil content; stimulant and diuretic by virtue of the presence of the alkaloid, theobromine.

Cacao butter—Taken internally, cacao butter is nutrient, like most other fats and fixed oils, but its demulcent and emollient properties are by far the most important. On account of its firm consistency and the fact that it melts at body temperature, and is free from irritant properties, it is the most logical and useful of the suppository bases, both as a carrier for other medicines and for its own inherent properties. Externally it is employed in cosmetic preparations and applied to inflamed and abraded surfaces.

Cocoa—Used as a beverage, has about the same stimulating effect as good coffee.

Official Preparations: N.F. V.
Syrup of Cocoa.
Tabellæ.

KOLA

(kō′lȧ)

KOLA—N.F.

Synonyms: Kola nuts; Cola; Sudan coffee.

Source: Cola nitida (Ventenant) Schott and Endlicher, or of other species of Cola (Fam. Sterculiaceæ).

Etymology: Cola is the native African name of the drug.

Part Used: The cotyledons of the seeds, which should contain not less than 1 per cent of caffeine.

Description and Physical Properties: *Unground Kola:* Irregularly plano-convex, broadly oval, or approaching circular in outline, from 2.5 to 5 cm. in length; heavy, hard and tough; brown with the outer surfaces slightly wrinkled, the inner surfaces lighter and smoother; edges slightly incurved and sharp. Odorless; taste slightly astringent.

Habitat: Africa. Cultivated in India, Ceylon, West Indies and South America.

Discussion: The kola tree grows very large and was formerly restricted to western Africa between Sierra Leone and the Congo or lower Guinea. It was entirely unknown on the east coast of Africa, but has since been transplanted there by the English who have also introduced it in many other of their foreign possessions. The tree bears flowers and fruits throughout the year, but the principal harvesting periods occur in the spring and fall.

The fruit is a pod some 5 or 6 inches in length and 2 or more inches in thickness. As it begins to ripen, it takes on a chocolate-brown color and slowly dehisces, showing both red and white seeds at the same time. It is gathered at this time and the seeds carefully removed and packed for shipment. The handling of the fresh seeds must be done very carefully since if they are bruised, they become discolored by the formation of a phlobaphene. The seeds, when fresh, resemble somewhat those of the horse chestnut. It is claimed that the fresh seeds are far superior in taste and more active medicinally than the dried ones.

Constituents: Caffeine, 2 to 2.4 per cent; theobromine, 0.02 per cent.

Properties and Uses: Because of the caffeine and theobromine present, kola acts as a general stimulant and nervine. It increases the power to withstand fatigue. Its action, however, is no different from that of coffee or chocolate in this respect. It is used as a cardiac and renal stimulant and is valuable in the treatment of fatigue, headache, migraine and neuralgia.

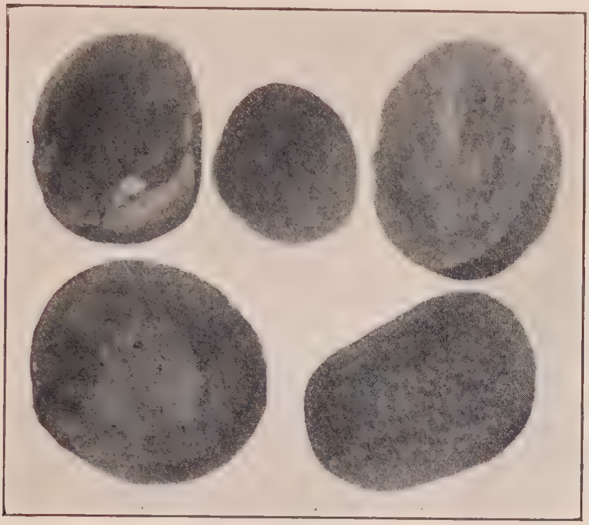


FIG. 46.—Kola.

DOSE: 60 gr. (4 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Kola, 1 fl. dr. (4 cc.).

CHAPTER XXXIII

MALVACEÆ

(măl-vā′sē̇-ē)

MALLOW FAMILY

This is a widely distributed family consisting of 35 genera and over 700 species. They consist of herbs, shrubs and trees and are characterized by the entire or palmate leaves and the showy, pentamerous flowers having monadelphous stamens with one-celled anthers. There are several types of mucilage-bearing organs, some located in the cortex and others in the pith.

(*a*) ALTHÆA

(ăl-thē′ȧ)

ALTHEA—U.S.P.

(*b*) ALTHÆÆ FOLIA

(ăl-thē′ī fō′lĭ-ȧ)

ALTHEA LEAVES—N.F.

Synonyms: (*a*) Marsh Mallow Root.

(*b*) Marsh Mallow Leaves. The plant is also known as White Mallow; Wymote; Sweetweed.

Source: Althæa officinalis Linné (Fam. Malvaceæ).

Etymology: Althæa from the Gr. "althaia," *marsh mallow*, given in honor of Althaia, in Greek mythology the wife of Œneus and mother of Meleager.

Officinalis from the Lat. "officina," *a work shop* or *store*, from the Lat. "opus," *work*, and "facere," *to do*, referring to the fact that it was kept for sale in the stores.

Malvaceæ from the Gr. "malacos," *soft* or *mild*, referring to its demulcent properties, or to the soft, downy leaves.

Folia, the Lat. for "*leaves*," from "folium," *a leaf*.

Part Used: (*a*) The dried root deprived of the brown, corky layer and small roots.
(*b*) The dried leaves.

Description and Physical Properties: (*a*) *Unground Althea:* Slenderly tapering, when entire up to 30 cm. in length and 2 cm. in thickness, usually cut into small pieces, about 5 mm. in diameter; externally whitish, longitudinally furrowed, frequently spirally twisted and covered with somewhat loosened bast-fibers; fracture of bark fibrous, of wood short and granular; internally yellowish white; bark 1 to 2 mm. thick, porous, due to mucilage cells, and separated from the slightly radiating wood by a distinct grayish cambium zone; odor slight; taste sweetish, mucilaginous.

(*b*) *Unground Althea Leaves:* Crumpled or matted; gray green or yellowish gray green; densely and finely tomentose throughout; petioles 1 to 6 cm. long; blades 3 to 15 cm. long and 3 to 10 cm. wide, thin, cordate or rhomboidal-ovate in outline, rounded or nearly truncate at the base, acute at the apex; margin doubly serrate-dentate, the principal teeth from 1 to 3 pairs, the lowest almost large enough to be regarded as lobes, the secondary very irregular, triangulate, acute, broader than long, the sinuses acute; 2 to 6 principal veins originating with the midrib in the petiole, prominent underneath, terete; branches of midrib arising at a wide angle, nearly straight, each terminating in a marginal tooth. Odor slight, scarcely characteristic; taste mucilaginous.

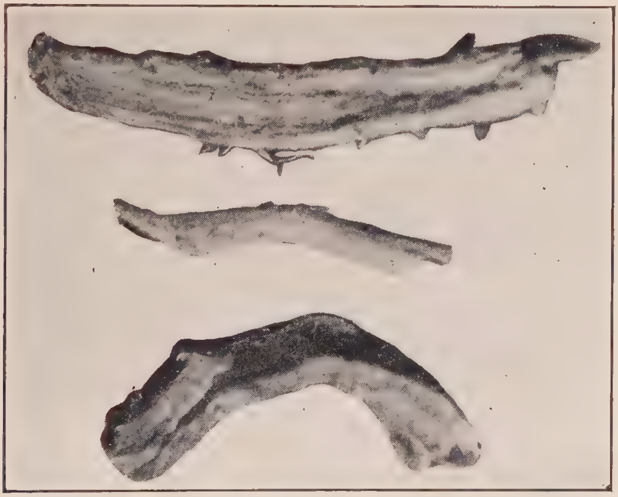


Fig. 47.—Althea root.

Habitat: Europe, northern and western Asia. Cultivated in New England, New York and Australia.

Discussion: This is a perennial, herbaceous plant, sending up, each year, several erect, downy stems from 3 to 4 feet in height and resembling those of the hollyhock in their general appearance. The leaves which are alternate and petiolate, are covered on both sides with a soft down. The flowers are terminal and axillary, two or three occurring on the same peduncle. They are about 2 inches in diameter and are purple in color. The fruit consists of several capsules arranged in a circular form, each containing one seed.

Marsh mallow grows best in wet, marshy places and along the borders of streams. It seems to be particularly adapted to salt marshes. The roots are collected in the fall from plants of the second year's growth. The periderm is removed by scraping with a knife after which the roots are carefully dried. The leaves are gathered during June and July while the plant is in bloom.

CONSTITUENTS: (*a*) The root—Mucilage, 25 to 35 per cent; starch, 35 per cent; sugar, about 10 per cent; asparagin (amido-succinamide), 1 to 2 per cent; pectin, about 10 per cent. The asparagin may be separated from the mucilage by dialyzation, the asparagin passing through the septum into the water, since it is crystaloidal, while the mucilage is colloidal. Upon evaporating the water, colorless, transparent, lustrous crystals of asparagin separate out.

(*b*) The leaves—Mucilage is the main constituent of the leaves also, and the one to which their medicinal properties are due. Calcium oxalate is also present in small amount.

PROPERTIES AND USES: Althea root is demulcent and emollient and is made into a demulcent drink for inflammatory conditions in which it soothes irritated mucous membranes with which it comes in contact and promotes their healing. The powder is absorbent and, because of this property, is employed as an ingredient of pills, troches, etc.

Althea leaves are employed in the form of a poultice, usually made from the emollient species of the National Formulary, for the purpose of relieving local inflammations and reducing pain. The leaves may also be administered in the form of an infusion for the same conditions as is the root.

DOSE: (*a*) The root—Ad libitum. (The U.S.P. indicates no dose.)
(*b*) The leaves—30 gr. (2 Gm.).

OFFICIAL PREPARATIONS:

U.S.P. X.
- Mass of Mercury, 5 gr. (0.3 Gm.).
- Pills of Ferrous Carbonate, 2 pills.
- Pills of Phosphorus, 1 pill.

N.F. V.
- Emollient Species.

(*a*) GOSSYPIUM PURIFICATUM

(gŏ-sĭp′ĭ-ŭm pū′rĭ-fĭ-kā′tŭm)

PURIFIED COTTON—U.S.P.

(*b*) GOSSYPII CORTEX

(gŏ-sĭp′ĭ-ī kôr′tĕks)

COTTON ROOT BARK—N.F.

(*c*) OLEUM GOSSYPII SEMINIS

(ō′lė-ŭm gŏ-sĭp′ĭ-ī sĕm′ĭ-nĭs)

COTTONSEED OIL—U.S.P.

SYNONYMS: (*a*) Absorbent cotton; Cotton wool.
(*c*) Cotton oil.

SOURCE: Cultivated varieties of Gossypium herbaceum Linné, or of other species of Gossypium (Fam. Malvaceæ).

ETYMOLOGY: Gossypium from the Arabic "goz," *a soft, silky substance.*

Herbaceum from the Lat. "herbaceus," *herb-like.*

Purificatum from the Lat. "purificare," *to make pure,* from "purus," *pure,* and "facere," *to make.*

Cortex, the Lat. for bark. Strictly speaking, the cortex is that portion of the stem or roots of plants which is external to the vascular tissue and in the perennials is known as the bark when it is modified by the formation of cork which replaces the epidermis.

Seminis from the Lat. "semen," *seed,* from "serere," *to sow* or *scatter seed.*

PART USED: (*a*) The seed hairs.
(*b*) The bark of the roots.
(*c*) The fixed oil expressed from the seeds.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) White, soft, fine filaments, appearing under the microscope as hollow, flattened and twisted bands, spirally striate and slightly thickened at the edges. It is odorless and almost tasteless.

Purified Cotton is insoluble in ordinary solvents, but is soluble in ammoniated cupric oxide T.S.

(*b*) *Unground Cotton Root Bark:* In flexible bands or quilled pieces; attaining a length of 30 cm. and a thickness of about 1 mm.; outer surface orange brown, sometimes smooth, but usually finely wrinkled and fissured longitudinally and roughened from the tendency of the corky layers to exfoliate the fibrous inner bark; inner surface light brown, longitudinally striate; fracture tough, fibrous, the inner bark readily separable into fibrous layers. Odor slight; taste very slightly acrid.

(*c*) A pale-yellow, oily liquid. It is odorless or nearly odorless, and has a bland taste.

Cottonseed Oil is slightly soluble in alcohol, but is miscible with ether, chloroform, petroleum benzin, and with carbon disulphide.

HABITAT: India, China, Arabia, Egypt, United States, West Indies, Spain, Australia, South America.

DISCUSSION: This is an annual plant growing from 3 to 5 or more feet in height. The flowers are of a sulphur-yellow color when first expanded, but become pink within the course of a day or so. The fruit is called a "*boll.*" It is a capsule about the size of a walnut. As it ripens, it opens by longitudinal fissures, revealing the loose, white tufts of seed hairs commonly called the "*cotton fiber.*" Each seed hair or "*fiber*" is a single, elongated, epidermal cell which, under the microscope, appears like a twisted hollow ribbon. The cell is really more or less collapsed and twisted.

Cotton has been in use for a very long time; so long in fact that it is impossible to determine when or where it originated. It has been cultivated in India for more than 3000 years. Egypt had a well-developed cotton industry 4000 years ago. It is found in the mounds of the Aztecs in Mexico, which probably antedate the pyramids of Egypt.

Cotton is grown economically between the 36° parallels of north and south latitude in nearly all parts of the world where the altitude and rainfall are suitable. It is essentially a sun plant, but must have moisture and has a long taproot which penetrates the soil to a considerable depth in search of water. The American Cotton Belt is especially fortunate in both climate and rainfall and in the quality of the soil. The fact that this region requires no irrigation, as is the case in India and Egypt, gives this country an advantage that cheaper labor elsewhere may never hope to overcome.

The fiber is removed from the seeds by means of the cotton gin. It is then purified by boiling with a dilute solution of sodium hydroxide to saponify the oil which is naturally present to a small extent. It is then washed in pure water to remove the soap thus formed. This constitutes the "*purified cotton*" or "*absorbent cotton*" of the market which is nearly pure cellulose. After the separation of the fibers, the seeds are run through a machine called a "*decorticator*" which cuts them in two; then the hulls are separated from the kernels by means of air blasts. The hulls, thus separated, are used as fertilizer and to some extent as a cattle food. The kernels are then steamed until they become a mush which is put in bags and subjected to enormous pressure between hot plates for the recovery of the oil. The oil thus obtained is more or less turbid and reddish in color, so must be refined. There are several methods of refining cottonseed oil. Much of the impurity will subside on long standing and this fact is taken advantage of by allowing the oil to remain in tanks for a considerable length of time, after which it is subjected to any of the other processes for completing the purification. These usually consist of pressure filtration in some form which serve to remove the impurities remaining and decolorize the oil to a considerable extent. Another method is to express the seeds in the cold which yields a smaller amount but a superior quality of oil. Cottonseed oil is classed as a semi-drying oil.

By the process known as "*winter chilling*," most of the stearin may be removed. This purified oil is used in making lard substitutes. The refined oil is largely employed in the place of olive oil as a cooking and salad oil. Over 5,000,000 tons of cottonseed are expressed annually for the recovery of the oil in this country alone. The oil obtained amounts to approximately 200,000,000 gallons. About one-fourth of this goes into the manufacture of lard substitutes and compounds. A still greater portion is exported, while a large amount is also used in the manufacture of soap. Notwithstanding the enormous production of cotton in this country, the statistics for 1924 show that 160,615,855 pounds of cotton were imported.

CONSTITUENTS: (*a*) The fiber consists of nearly pure cellulose.

(*b*) The bark contains a resinoid and tannin.

(*c*) Cottonseed oil is a mixture of stearin, palmatin and olein in varying proportions.

PROPERTIES AND USES: Absorbent or "sterilized cotton" is a protective and is widely employed as a surgical dressing for wounds, scalds, burns, etc. In such cases, it serves (*a*) to protect the part mechanically, (*b*) to absorb blood, mucus and pus, and (*c*) to keep out germs of infection. Sterilized cotton pads and gauze are also extensively employed as surgical dressings. Commercially, enormous quantities of purified cotton are used in the manufacture of explosives, celluloid and ivory substitutes.

The preparations of cotton root bark are emmenagogue and oxytocic and are employed in a variety of uterine derangements.

Cottonseed oil is nutrient and demulcent and is employed for the same purposes as olive oil and almond oil.

DOSE: (*b*) Cotton root bark—30 gr. (2 Gm.).

OFFICIAL PREPARATIONS:

U.S.P. X.

(*c*) Camphor Liniment.

N.F. V.

(*a*) Styptic Cotton.

(*a*) Fluidextract of Cotton Root Bark, 30 m. (2 cc.).

The following tabulation gives some of the many uses of the various portions of the cotton plant:

Root	Bark used in medicine.
Stem	The fiber when pulped can be made into high-grade paper. When ground and compressed into sheets is used for mechanical purposes.
Seed	Oil—Prepared and offered in several grades. Constitutes a pure, nutritious, healthful food used as a replacer for lard in cooking, an addition to lard in cold climates to soften it; in the form of hydrogenated oil is used in enormous quantities in the manufacture of oleomargarine. Used as a salad oil. "Meats"—When ground, yield a flour used for bread and other baked goods. Hulls—Cattle feed, fuel, fertilizer. Yield fair grade of potash. Oil or Seed Cake—Feed for cattle, horses, swine, poultry and sheep.
Cotton Fiber or "Cotton"	Better grades—For high-grade cloth, fabric and cords for automobile tires; absorbent cotton; felt; mixed with wool to make felt and fleece linings; mixed with shoddy for cloth. Cheaper grades—Used for pads, upholstering, cushions, horse collars, mattresses, wicking, yarns, nitrocellulose, smokeless powder, paper, varnishes, plastics, artificial silk.

MALVÆ FOLIA

(măl′vē fŏl′ĭ-ȧ)

MALLOW LEAVES—N.F.

Synonyms: Malva sylvestris is variously known as Common Mallow, High Mallow, Cheese-cake Plant and Pan-cake Plant; while Malva rotundifolia is called commonly Dwarf Mallow, Low Mallow, Running Mallow, Doll-cheeses and Fairy-cheeses.

Source: Malva sylvestris Linné, and Malva rotundifolia Linné (Fam. Malvaceæ).

Etymology: Malva from the Lat. "malva" *mallow*, i.e., belonging to the mallow family.

Folia, the Lat. for leaves.

Sylvestris from the Lat. "silva," less correctly "sylva," *a wood* or *grove*, i.e., grows in the woods.

Rotundifolia from the Lat. "rotundus," *round* and "folium," *leaf*, i.e., round-leaved.

Part Used: The dried leaves.

Description and Physical Properties: *Unground Mallow Leaves:* Leaves of *Malva sylvestris*, petiolate with petioles up to 10 cm. in length, orbicular or reniform, slightly truncate or cordate at the base, from 10 to 11 cm. in length, and from 15 to 20 cm. in width, with 3 to 7 shallow, angular or rounded lobes, venation palmate, margins crenate-dentate, pubescent on both sides. Leaves of *Malva rotundifolia,* with petioles up to 20 cm. in length, orbicular, up to 8 cm. in width, base deeply cordate, 5 to 7 shallow lobes, venation palmate, margins with rounded blunt teeth, pubescence more scant than in *M. sylvestris.* Intermixed with the leaves are frequently found dark purple flowers and glabrous reticulated carpels (*M. sylvestris*) or pale bluish flowers and pubescent rounded carpels (*M. rotundifolia*). Inodorous; on chewing it becomes very mucilaginous, taste bland.

HABITAT: Europe, United States.

DISCUSSION: Malva rotundifolia is so well-known as a garden pest that no description of it here seems necessary. As its name implies, it has a round, heart-shaped leaf, somewhat lobed and crenate. The stem is procumbent, the flowers white and the fruit a flat, circular disk composed of numerous wrinkled carpels, each containing a single seed. Malva sylvestris is not so common. It received the name "*cheese-cake*" and "*pan-cake*" plant from the shape of the fruits which are also circular, flat and thin.

CONSTITUENT: Mucilage.

PROPERTIES AND USES: Mallow leaves, because of the mucilage present, are demulcent and emollient. An infusion may be drunk for its soothing action on the stomach and bowel in cases of gastritis and enteritis. Externally the leaves are applied, moist, as a poultice to inflamed areas, sprains, etc.

OFFICIAL PREPARATION: N.F. V.

Emollient Species.

CHAPTER XXXIV

SALICACEÆ

(săl′ĭ-kā′sḗ-ē)

WILLOW FAMILY

This is a small family containing but 2 genera, "Salix" and "Populus." It consists of diœcious trees and shrubs with apetalous flowers arranged in aments.

SALICINUM

(săl′ĭ-sī-nŭm)

SALICIN—U.S.P.

Source: Several species of Salix (willow) and Populus (poplar) (Fam. Salicaceæ).

Etymology: Salicin from the Lat. "salix," *willow*, from the Celtic "sal," *near*, and "lis," *water*, i.e., it grows in wet or damp places.

Populus, Lat. for "poplar," from "populus," *the people*, from the fact that the trees were planted along the public ways in Rome. It was known as "*arbor populi*," tree of the people.

Part Used: The glucoside ($C_{13}H_{18}O_7$) obtained from the bark.

Description and Physical Properties: Colorless, silky, shining needles or prisms, or a white, crystalline powder. It is odorless and has a very bitter taste.

One Gm. of salicin is soluble in 23.5 cc. of water and in 88.5 cc. of alcohol, at 25° C. One Gm. is soluble in 3.3 cc. of water at 80° C., and in 30 cc. of alcohol at 60° C. It is insoluble in chloroform and in ether.

Habitat: Europe, North America.

Discussion: Both the willow and the poplar are too well known to require any description here. The white willow (Salix alba), purple willow (Salix purpurea) and the crack willow (Salix fragilis) are all used for the recovery of the glucoside, the purple willow containing the largest quantity of salicin. Of the poplars, Populus alba, Populus angustifolia and Populus tremula all produce salicin to a considerable extent.

Several methods are employed in recovering the salicin, but the following description will serve to illustrate the general principles and procedures necessary: A strong decoction is made by boiling the bark in water. After straining, the tannin, gum and extractive are precipitated by the addition of basic lead acetate or litharge. Again it is strained and all traces of dissolved lead precipitated by the addition of barium sulphide and sulphuric acid. Again it is filtered and calcium carbonate added (when basic lead acetate is employed) to neutralize the free acid. The solution is then concentrated whereupon the salicin crystallizes out. This is recovered and purified by re-crystallization.

Properties and Uses: Salicin is used as an antipyretic and antiperiodic in intermittent fevers. Its effects are about the same as those of salicylic acid but it is only half as strong.

Dose: 15 gr. (1 Gm.).

POPULI GEMMÆ

(pŏp′ū-lī jĕm′ē)

BALSAM POPLAR BUDS—N.F.

Synonym: Balm of Gilead Buds.

Source: Populus nigra Linné, Populus candicans Aiton, or Populus balsamifera Linné (Fam. Salicaceæ).

Etymology: Populi, genitive of the Lat. "populus," *poplar*.

Gemmæ plural of the Lat. "gemma," *a bud*, especially a leaf-bud.

Balm of Gilead from the Lat. "balsamum," *balsam* and "Gilead," a region, city or mountain east of the Jordan.

Nigra from the Lat. "niger," *black*.

Balsamifera from the Lat. "balsamum," *balsam* and "ferre," *to bear*, i.e., balsam-bearing.

Candicans from the Lat. "candicans," *whitish*, from "candicare," *to be whitish*, referring to the color of the bark.

Part Used: The air-dried, closed winter leaf-buds, collected early in the spring.

Description and Physical Properties: Conical, pointed, up to 2 cm. in length, and from 2 to 5 mm. in thickness, consisting of closely imbricated scales, externally brown and glossy, glutinous with fragrant resin; internally with abundant oleoresin and numerous crystals of salicin. Odor pleasant, balsamic; taste aromatic and bitter.

Habitat: Eastern Canada, Northern United States.

Discussion: The tree producing this drug grows very large, reaching the height of nearly 100 feet, with a trunk from 4 to 6 feet in diameter.

The leaf-buds are protected by tough, cartilaginous scales which are coated with a thick oleoresin.

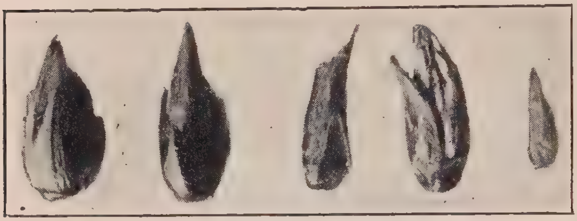


FIG. 48.—Balsam poplar buds.

CONSTITUENTS: Volatile oil; resin.

PROPERTIES and USES: Employed in the form of a salve or ointment applied to sores, ulcers, bruises and various forms of skin disease. The drug is used internally as a stimulating expectorant.

DOSE: 60 gr. (4 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Syrup of White Pine, 1 fl. dr. (4 cc.).
Compound Syrup of White Pine with Morphine, 30 m. (2 cc.).

CARBO LIGNI

(kär′bō̆ lĭg′nĭ)

WOOD CHARCOAL—U.S.P.

SYNONYM: Charcoal.

SOURCE: Various soft woods.

ETYMOLOGY: Carbo, the Lat. for *coal.*
Ligni, genitive form of the Lat. "lignum," *wood.*

PART USED: The wood which has been carbonized by exposure to a red heat without access of air.

DESCRIPTION AND PHYSICAL PROPERTIES: A black, odorless, and tasteless powder, free from gritty matter.

DISCUSSION: Charcoal is made by destructive distillation of various species of our native soft woods. When prepared in iron cylinders, properly equipped to take care of the gases given off, as high as 22 to 23 per cent of an excellent grade of charcoal is obtained, in addition to other pyroligneous products such as wood alcohol, acetic acid, etc. The more common method, however, consists in piling short blocks of wood in conical "stacks" around a central opening or flue. These stacks are covered with earth and sod, leaving an opening at the top and several openings at the bottom. The wood is then ignited at the lower openings and when combustion is well started the openings are closed, the combustion proceeding from that point on without access of air. With this method from 17 to 18 per cent of charcoal is obtained, the gases, of course, being lost.

A more recent method of preparing charcoal is to treat the wood, contained in iron cylinders, to the action of super-heated steam. The composition of the charcoal formed varies according to the temperature of the steam and the length of exposure. The yield is somewhat greater than that of either of the other two methods.

Constituents: Charcoal consists of practically pure carbon. When desired for medicinal use it should preferably be prepared from poplar, linden or willow wood, the process being carried out in iron cylinders at a red to white heat. It should then be purified by macerating in water for several days to remove all soluble pyroligneous products.

Properties and Uses: The property of various charcoals for absorbing certain gases in large amounts has long been known. During the World War enormous quantities of charcoal prepared from coconut shells and peach pits were used in the manufacture of gas masks to absorb the deadly products of exploding gas shells. This property is increased by the addition of certain salts as zinc, stannous, and magnesium chlorides which serve as activators.

Charcoal is administered internally in cases of fermentative dyspepsia for the purpose of absorbing the gas formed. In such cases it appears to act in other ways than as a mere gas absorber. Applied externally in the form of a poultice, it absorbs foul odors from ulcers, cancer, etc., but has gradually been replaced by better agents.

Dose: 15 gr. (1 Gm.).

CHAPTER XXXV

GERANIACEÆ

(jė̄-rā′nĭ-ā′sė̄-ē)

GERANIUM FAMILY

These are herbaceous plants indigenous to temperate climates. They number 11 genera and about 350 species, most abundant in South Africa. The leaves are simple, alternate or opposite, the flowers perfect and the fruit a dehiscent capsule.

GERANIUM

(jė̄-rā′nĭ-ŭm)

GERANIUM—N.F.

Synonyms: Crane's-bill; Stork's-bill; Alum Root; Crowfoot; Spotted Geranium; Wild Geranium; Dovefoot.

Source: Geranium maculatum Linné (Fam. Geraniaceæ).

Etymology: Geranium from the Gr. "geranos," *crane*, referring to the long, beak-like termination of the seed capsule which resembles a crane's-bill.

Maculatum from the Lat. "macula," *spot*, i.e., the leaves acquire whitish spots on ageing.

Part Used: The dried rhizome.

Description and Physical Properties: *Unground Geranium:* Rhizome cylindraceous, somewhat branched, bent, flattened and strongly tuberculated, from 2.5 to 10 cm. long and from 3 to 15 mm. in diameter; surface marked with root scars and remnants of slender roots, longitudinally wrinkled; externally dark purple-brown; internally light purple brown; fracture short, non-fibrous, the section shows a thin bark, a distinct cambium, irregular in outline, large central pith, wood indistinct, the fibro-vascular bundles few and at unequal distances. Odorless; taste strongly astringent.

Habitat: Canada, Eastern United States as far south as Georgia.

Discussion: This plant has a fleshy, perennial rhizome and an erect, annual stem from 1 to 2 feet in height. The entire upper-ground portion is thickly covered with hairs. The leaves, which are deeply divided into three, five or seven lobes, are of a pale-green color, mottled with still paler spots. From the forks of the stem arise short peduncles, each supporting two large, rose-purple flowers. The fruit consists of an aggregate of five one-seeded capsules. The plant grows best in moist woodlands and low ground. The rhizome should be collected in autumn after the death of the foliage.

Constituents: Tannic acid, 10 to 28 per cent; gallic acid; red coloring matter.

Properties and Uses: Geranium, because of the large amount of tannin present, is styptic and is used to control local hemorrhages. On account of its astringent properties, it is used internally in chronic dysentery, diarrhœa and cholera infantum. It is used to treat the mucous membranes of the throat, rectum and vagina for the purpose of correcting relaxed conditions of those tissues.

Dose: 15 gr. (1 Gm.).

Official Preparation: N.F. V.

Fluidextract of Geranium, 15 m. (1 cc.).

CHAPTER XXXVI

MELIACEÆ

(mē′lĭ-ā′sė̆-ē)

MELIACEÆ

This family, consisting of tropical trees and shrubs, numbers 37 genera and about 600 species. The family includes the mahogany, the Spanish cedar and the flindosa. The principal distinguishing feature is the monadelphous stamens.

COCILLANA

(kō′sĕl-yän′yä)

COCILLANA—N.F.

Synonym: Guapi Bark.

Source: Guarea Rusbyi (Britton) Rusby (Fam. Meliaceæ).

Etymology: The names "Cocillana," "Guapi" and "Guarea" are all derived from the local Indian language.

Meliaceæ from the Gr. "melia," *the ash tree*, referring to the appearance of the bark.

Part Used: The dried bark.

Description and Physical Properties: *Unground Cocillana:* In flat or curved pieces of variable length and width up to about 2 cm. thick; outer surface shallowly or deeply fissured, according to age and thickness; gray brown, often ashy gray from lichen growths, or of an orange brown where the cork has been removed; inner surface of medium brown color, strongly and coarsely longitudinally striate, the striæ straight or wavy; inner bark usually much thicker than the outer, its fracture coarsely splintery-fibrous and soft. Odor characteristic; taste slightly astringent, peculiar and slightly nauseous.

Habitat: Bolivia.

Discussion: This drug is obtained from a tree found growing on the eastern slope of the Andes Mountains in Bolivia. It has a thick ash-colored bark which is slightly fissured when young, but becomes deeply fissured and quite rough with age. The inner surface of the bark is yellowish in color. The drug occurs in flat or curved pieces of variable length and width. It has a characteristic odor and a peculiar, slightly nauseous taste.

Constituents: Rusbyine, an alkaloid; resin, 2.5 per cent; fixed oil; tannin.

Properties and Uses: Cocillana is expectorant and is said to be superior in this respect to ipecac. It is used in bronchitis, and various respiratory troubles for the purpose of increasing the secretions and lessening cough. Larger doses are emetic.

Dose: 15 gr. (1 Gm.).

Official Preparation: N.F. V.

Fluidextract of Cocillana, 15 m. (1 cc.).

CHAPTER XXXVII

LINACEÆ

(lī-nā′sė-ē)

FLAX FAMILY

This is a small family of herbs, shrubs and trees. They have perfect, symmetrical flowers and many-seeded capsules. The mucilaginous, epidermal layer in the seed and leaves of linum (the principal member of the group) is of especial interest. Non-glandular, uni-cellular hairs and glandular, multi-cellular hairs are present in most of the species. There are 4 genera and about 150 species.

(*a*) LINUM

(lī′nŭm)

LINSEED—U.S.P.

(*b*) OLEUM LINI

(ō′lė-ŭm lī′nī)

LINSEED OIL—U.S.P.

Synonyms: (*a*) Flaxseed.
(*b*) Flaxseed oil.

Source: Linum usitatissimum Linné (Fam. Linaceæ).

Etymology: Linum from the Gr. "linon," from the Celtic "llin," *a thread*. The Lat. "linum," from "linea," *a thread*, referring to the use of the fibers in making fabrics.

Usitatissimum is the superlative form of the Lat. adjective "usitatus," *useful*, and signifies "*very*" or "*most*" *useful*.

The word "flax" comes from the Anglo Saxon verb "fleax, flechten," *to braid*, referring, of course, to the uses made of the fiber.

Part Used: (*a*) The ripe seeds.
(*b*) The fixed oil expressed from the seeds.

Description and Physical Properties: (*a*) *Unground Linseed:* Ovate or oblong-lanceolate, flattened, obliquely pointed at one end, from 4 to 6 mm. in length; externally brown, smooth and shiny; raphe a distinct yellow ridge along one edge, the hilum and micropyle in a slight depression just below the pointed end; internally light yellow or brownish, oily; odor slight; taste mucilaginous and oily.

(*b*) A yellow, oily liquid, having a peculiar odor, and a bland taste. When exposed to the air, it gradually thickens, darkens in color, and acquires a more pronounced odor and taste.

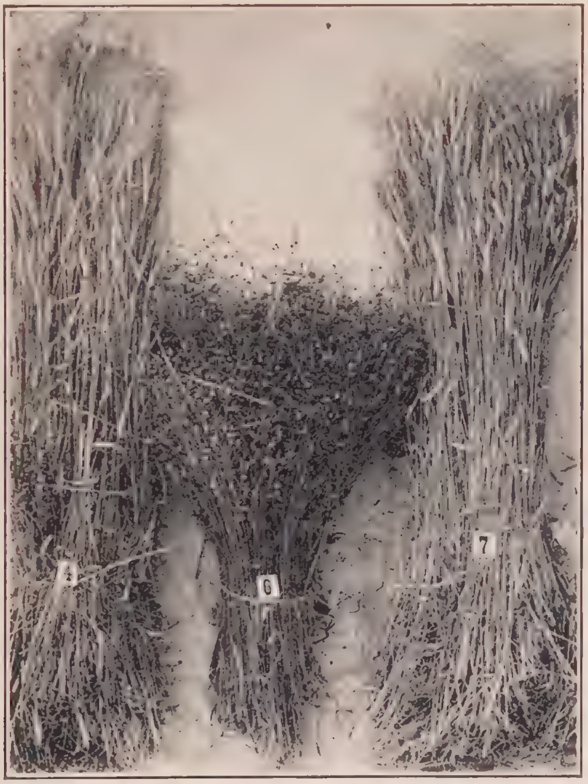


Fig. 49.—The bundle in the centre, marked "6" is flax as it is cut and tied in the field. No. 4 is a mixture of flax and wheat while No. 7 is wheat only. (Courtesy of the North Dakota Agricultural College.)

Linseed Oil is slightly soluble in alcohol, but is miscible with ether, chloroform, petroleum benzin, carbon disulphide, and with oil of turpentine.

Habitat: Cultivated in all countries of temperate climate where it can be grown economically.

Discussion: Flax is an annual plant with an erect, slender stem about 2 feet in height. The leaves are small, sharp-pointed, entire margin and of a pale-green color. The flowers are small, funnel-shaped and of a pale-blue color. The fruit is a globular capsule about the size of a small pea. It contains ten cells, each enclosing a single seed.

There has been considerable speculation as to the original home of flax, some claiming that it originated in Egypt, while others maintain that central Asia deserves that credit. Excepting cotton, no plant known to domestic economy has a wider range of uses or a wider geographical distribution than flax. The products of this plant were in use by the people of western Asia before the founding of Babylon. It was cultivated in Egypt at least six centuries before the dawn of the Christian era. The seeds and fabric made from the bast fibers were found in the remains of the Swiss Lake dwellings.

The epidermis of the seed coat contains a large amount of dry, hard mucilage. Sometimes the seeds are roasted to destroy this mucilage before pressing them for the recovery of the oil. While the oil thus obtained is free from mucilage, it is more highly colored and somewhat acrid in taste due to the heat employed. For medicinal use, the oil should be obtained by cold expression. In case it has become rancid, this property can be removed to a large extent by agitating the oil with warm water, allowing it to stand for a time and decanting. In the year 1924, 16,588,940 bushels of linseed were imported. During the same period, 13,247,190 pounds of linseed oil were shipped in.

CONSTITUENTS: (*a*) Linseed—Fixed oil, 35 to 40 per cent; mucilage, 15 per cent; protein matter, 25 per cent.

(*b*) Linseed oil—Stearin; palmatin; olein; myristin; linolein.

PROPERTIES AND USES: Unground flaxseed is steeped in water to make an infusion or tea which, on account of the mucilage present, forms a demulcent drink that is used to allay inflammation. Flaxseed poultices, made from the ground meal and applied hot, are very efficient.

When taken internally, linseed oil is demulcent and laxative. It is used in doses of one fluid ounce as a cathartic, and is sometimes used as an enema in cases of fecal impaction. It is used frequently by veterinarians as a laxative for horses and cattle. Linseed oil is applied externally, either by itself or in the form of lime liniment for burns, scalds and frostbites. Commercially it is extensively employed in the manufacture of paints and varnishes.

The following diagram shows a few of the many uses of the several parts of the flax plant and indicates why it bears the specific name "usitatissimum":

- Flax
  - Stem
    - Straw—Compressed into thick sheets and used as insulating material in building construction; reduced to pulp makes good paper.
    - Fiber—Yields linen for thread, lace, rugs, matting and cloth such as linen, cambric, toweling and lawn.
  - Seed
    - Oil—Used in paints and varnishes, 70,000,000 gal. per year in U.S.; linoleum, oil cloth, window shades, printer's ink, water-proofing fabrics, soaps.
    - Oil Cake or Meal—Produce 600,000 tons per year in U.S. Used as a cheap nutritious feed for livestock.

Official Preparations: U.S.P. X.

(*b*) Lime Liniment.
Compound Solution of Cresol.
Soft Soap.

CHAPTER XXXVIII

ERYTHROXYLACEÆ

(ĕr′ĭ-thrŏk′sĭ-lā′sē̇-ē)

COCA FAMILY

This is a very small family, consisting of but 2 genera. They are mostly tropical shrubs. The leaves are entire, the fruit a one-seeded drupe resembling that of the dogwood.

COCA

(kō′kȧ)

COCA—U.S.P. VIII

Synonyms: Coca Leaves; Erythroxylon; Huanuco Coca; Truxillo Coca.

Source: Erythroxylon Coca Lamarck and Erythroxylon Truxillense Rusby (Fam. Erythroxylaceæ).

Etymology: Erythroxylon from the Gr. "erythros," *red* and "xylon," *wood,* referring to the color of the wood of certain species.

Coca from the Peruvian "*cuca,*" the name of the plant.

Truxillense from "*Truxillo*" a coast city of northern Peru through which it enters the market.

Part Used: The leaves. They were required by the U.S.P. VIII to assay not less than 0.5 per cent of ether-soluble alkaloids.

Description and Physical Properties: *Huanuco Coca:* Greenish brown to clear brown, smooth and slightly glossy, thickish and slightly coriaceous, stoutly and very shortly petioled; blade 2.5 to 7.5 cm. long and nearly elliptical, with a very short and abruptly narrowed basal portion and a short point, the margin entire; midrib marked above by a slight ridge, very prominent underneath, the remaining venation rather obscure, especially above; underneath, a conspicuous line of collenchyma tissue runs longitudinally on either side of the midrib and about one-third of the distance between it and the margin, the enclosed areola being of a slightly different color from the adjacent surface; odor characteristic; taste bitterish, faintly aromatic, followed by a numbness of the tongue, lips, and fauces.

Truxillo Coca: Pale green, thin, brittle and usually much broken, smooth but not shining, shortly and stoutly petioled; blade 1.6 to 5 cm. long and one-third to one-half as broad, obovate to oblanceolate, narrowed from near the middle into the petiole, usually with a slight projecting point at the summit, the margin entire; underneath two irregular lines of collenchyma tissue, usually incomplete or obscure, and frequently wanting, run beside the midrib at about one-third the distance from it to the margin; odor more tea-like than that of Huanuco Coca; taste and numbing effect similar.

HABITAT: Peru, Chile, Bolivia.

DISCUSSION: The coca plant is a shrub or small tree, some of the species growing to the height of 20 feet. The original habitat is supposed to have been in the mountains of Peru, but at the present it is found in moist places on the whole eastern curve of the Andes from the Strait of Magellan to the Caribbean sea, at an altitude of from 1500 to 6000 feet.

The leaves are harvested three times a year, the first picking being made in the spring, from the twigs cut off at the time of pruning. The second picking occurs about the first of July and the third in October or November. Picking must be done during dry weather, since the curing of the leaves is carried on in the open air. When dry, the leaves are carefully packed in bags holding from 25 to 100 pounds. About 40,000,000 pounds of leaves are harvested in this region each year. Coca is now cultivated in the British East and West Indies, Java, Ceylon and India, but the product from these sources does not reach the United States.

Coca was used in South America prior to the Spanish conquest (1569), by the aborigines who extolled it as the "divine plant of the Incas that satisfied hunger, strengthened the weak and banished man's misfortunes." The Spanish conquerors were naturally jealous of such homage and forbade its use and cultivation. When, however, they observed that it enabled the enslaved natives to perform more work and render better service, they experienced a change of heart and encouraged its cultivation. Coca is cultivated extensively on the haciendas of the Andes mountains where these special plantations are known as "*cocales*." The importation of coca leaves during the year 1924 amounted to 129,879 pounds.

CONSTITUENTS: Cocaine ($C_{17}H_{21}NO_4$), benzoylecgonine, 0.5 to 1 per cent; alpha-hygrine; beta-hygrine and several other related alkaloids, all yielding ecgonine and methyl alcohol upon hydrolysis.

PROPERTIES AND USES: On account of the alkaloids present, coca is either stimulant, or anodyne and narcotic, depending on the manner of use and the amount taken. Like opium, it has a large field of use in the legitimate practice of medicine and surgery, but the large number of narcotic addicts that frequent the slums of our cities and fill our prisons and asylums bear mute testimony to the crime and degradation that follow the illegitimate use of these habit-forming drugs. The preparations of coca or its alkaloid, cocaine, are given as a stimulant in melancholia, debility and poisoning by chloral hydrate and opium. Its greatest use, however, is that of a local anesthetic in dentistry and minor surgery, in which it is very often combined with epinephrine. In such cases its depressant action on the sensory nerves renders them incapable of receiving or transmitting sensations of pain, thus allowing operations to be performed without the employment of a general anesthetic. These preparations are also used in epilepsy, hysteria, insanity and other forms of nervous disorders, but should never be employed in such chronic conditions as hay fever, asthma, etc., on account of their habit-forming properties. The use of cocaine and its salts is dropping off very materially, as they are being superseded by a number of synthetic substitutes which have all of the pain-allaying properties of cocaine but are free, or at least comparatively free, from the objectionable features of the natural alkaloid.

DOSE: 30 gr. (2 Gm.).
Cocaine, $\frac{1}{4}$ gr. (0.015 Gm.).

CHAPTER XXXIX

RUTACEÆ

(ro͞o-tā′sḗ-ē)

RUE FAMILY

This family consists of herbs, shrubs and trees, often glandular and strong-scented. The flowers are either tetramerous or pentamerous, with a compound ovary and four or five distinct or somewhat united carpels. There are 111 genera and about 800 species.

BUCHU

(bū′kŭ)

BUCHU—U.S.P.

Synonyms: Buku; Bucku; Bucco.

Source: Barosma betulina (Thunberg) Bartling et Wendland, or Barosma crenulata (Linné) Hooker, known in commerce as "*Short Buchu*"; or Barosma serratifolia (Curtis) Willdenow, known in commerce as "*Long Buchu*" (Fam. Rutaceæ).

Etymology: Buchu from the Zulu "bucu," the name of a mixture of aromatic leaves, from "buca," *to mix, to compound,* buchu leaves being one of the ingredients.

Barosma from the Gr. "barys," *heavy* and "osme," *odor,* referring to the strong odor of the plant.

Betulina from the Celtic "betu," the *beech,* because of the resemblance of the leaves.

Serratifolia from the Lat. "serratus," *notched,* from "serra," *a saw,* and "folium," *a leaf,* i.e., the margin of the leaf is notched like a saw.

Part Used: The dried leaves.

Description and Physical Properties: *Unground Short Buchu:* Rhomboidally oval or obovate, from 9 to 30 mm. in length and from 4 to 20 mm. in breadth; apex obtuse or rounded and sometimes recurved, base wedge-shaped or obtuse, margin finely dentate, glandular punctate, with an oil gland at the base of each tooth, papillose, longitudinally striate beneath, coriaceous and with a petiole about 1 mm. in length; color bright green to yellowish green, occasionally olive gray; odor aromatic, and mint-like; taste camphoraceous.

Ungrooved Long Buchu: Linear-lanceolate from 12 mm. to 4 cm. in length and from 4 to 10 mm. in breadth; apex acute, somewhat rounded; margin sharply serrate. Otherwise resembles Short Buchu.

Habitat: South Africa.

Discussion: This is an erect, slender shrub or bush growing extensively in Cape Colony and Cape of Good Hope. The leaves are well adapted to protect the plant against the hot, dry climate since there is a colorless layer of cells containing mucilage interposed between the epidermis and the mesophyll. This mucilage is hygroscopic, swelling on the addition of water and holding for the plant a considerable amount of moisture. The leaves are collected by the Hottentots who value them on account of their odor. They powder the leaves and rub the powder on their greased bodies as a sort of toilet procedure. In 1924, 146,001 pounds of buchu leaves were imported.

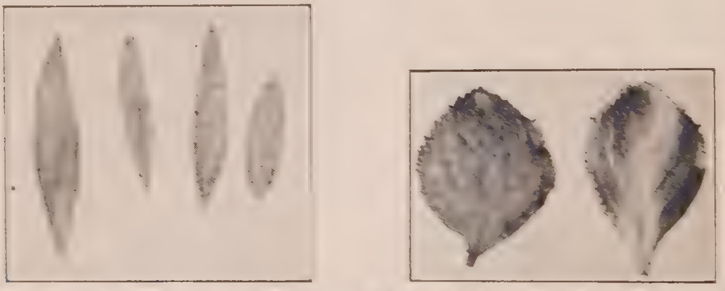


Fig. 50.—Buchu. The group of leaves at the left is long buchu. The two leaves at the right are short buchu.

Constituents: Volatile oil, 1 to 2 per cent; resin; diosphenol, a phenol-like body also known as "*barosma camphor.*"

Properties and Uses: Buchu is a diuretic and genito-urinary antiseptic of considerable value. It is used in conditions of catarrh or inflammation of the urinary passages which are acted upon by the volatile oil during the course of its elimination. Thus it is used in the treatment of diseases of the prostate, in gravel, urethritis and cystitis. Since a part of the volatile oil is eliminated through the bronchial mucous membrane and acts as an antiseptic to the tissues with which it comes in contact, buchu is held to be serviceable in inflammatory conditions of the respiratory tract, especially bronchitis.

Dose: 30 gr. (2 Gm.).

Official Preparation: U.S.P. X.

Fluidextract of Buchu, 30 m. (2 cc.).

PILOCARPUS

(pī′lô-kär′pŭs)

PILOCARPUS—U.S.P. IX

Synonyms: Jaborandi; Pernambuco Jaborandi; Maranham Jaborandi.

Source: Pilocarpus Jaborandi Holmes, known in commerce as "*Pernambuco Jaborandi*" and Pilocarpus microphyllus Stapf, known in commerce as "*Maranham Jaborandi,*" (Fam. Rutaceæ).

Etymology: Pilocarpus from the Gr. "pilos," *a cap*, and "karpos," *fruit*, referring to the shape of the fruit.

Microphyllus from the Gr. "mikron," *small*, and "phyllon," *leaf*.

Jaborandi is the Portuguese name, derived from the local South American name of the plant.

Part Used: The dried leaflets, which must assay not less than 0.6 per cent of alkaloids.

Description and Physical Properties: *Pernambuco Jaborandi:* Leaflets when entire, oval, oblong, or elliptical, from 4 to 10.5 cm. in length and from 2 to 4 cm. in breadth and with short, stout petiolules; summits more or less rounded or acute and emarginate; bases rounded or acute and mostly unequal; margins entire and narrowly revolute; very smooth, shiny, coriaceous and glandular-punctate; upper surfaces grayish to brownish green, midribs mostly depressed, under surfaces yellowish or greenish brown and slightly pubescent on the prominent midvein; peculiarly aromatic when crushed; taste bitterish, becoming somewhat pungent and having a sialogogue effect.

Maranham Jaborandi: Leaflets rhomboidally oval to obovate or elliptical, from 1.5 to 5 cm. in length and from 1 to 3 cm. in breadth, the lateral ones nearly sessile, the terminal ones on margined petiolules, from 0.5 to 1.5 cm. in length; of a nearly uniform grayish or yellowish-green color, rather thin but otherwise resembling Pernambuco Jaborandi.

Habitat: Brazil, Paraguay, Uruguay.

Discussion: The plants of this genus are woody shrubs, usually but slightly branched, the official members being found in the northern and eastern provinces of Brazil and in Paraguay and Uruguay. 427 pounds of the drug were imported from this district in 1924.

Constituents: Pilocarpine, 0.5 to 1 per cent; jaborine; volatile oil; several unimportant alkaloids.

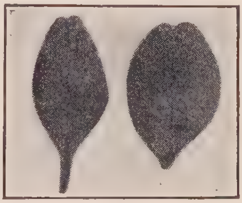


Fig. 51.—Pilocarpus leaves showing the notch at the apex.

Properties and Uses: Pilocarpine, which is the principal alkaloid present and fairly represents the action of the drug, is a diaphoretic of considerable power. As an eliminant (by sweating) of water and the waste products of metabolism, it is used in dropsies, uræmia, pleurisy and pulmonary œdema. Locally applied, in suitable dilution, pilocarpine is thought to be a stimulant to the growth of hair.

Dose: 30 gr. (2 Gm.)

(*a*) XANTHOXYLUM

(zăn-thŏk′sĭ-lŭm)

XANTHOXYLUM—N.F.

(*b*) XANTHOXYLI FRUCTUS

(zăn-thŏk′sĭ-lī frŭk′tŭs)

PRICKLY ASH BERRY—N.F.

Synonyms: (*a*) Zanthoxylum americanum: Northern Prickly Ash; Angelica Tree; Yellow Wood; Pepper Wood; Pellitory Tree.

Zanthoxylum Clava-Hercules: Southern Prickly Ash; Yellow Prickly Ash; Sea Ash; Hercules' Club; Yellow Hercules.

(*b*) Prickly Ash Fruit; Toothache Tree Fruit.

Source: Zanthoxylum americanum Miller, known in commerce as "*Northern Prickly Ash*" (Fam. Rutaceæ), and Zanthoxylum Clava-Hercules Linné, known in commerce as "*Southern Prickly Ash,*" (Fam. Rutaceæ).

Etymology: Xanthoxylum from the Gr. "xanthos," *yellow*, and "xylon," *wood*, because the roots are of a yellowish color.

Clava-Hercules from the Lat. "clava," *club*, and "Hercules," because the warty protuberances make the limbs resemble the fabled club of Hercules.

Fructus, the Lat. for "*fruit*," from "fructus," *enjoyment, product, fruit*, p.p. of "frui," *to enjoy*.

Part Used: (*a*) The dried bark.

(*b*) The dried, fully-grown fruit.

Description and Physical Properties: (*a*) *Unground Northern Xanthoxylum:* In transversely curved fragments or quills, from 2 to 15 cm. in length; bark from 0.5 to 2 mm. in thickness; outer surface light gray to brownish gray with grayish patches of foliaceous lichens; longitudinally wrinkled and with numerous whitish lenticles; the cork occasionally abraded, showing the yellowish or orange, inner bark; inner surface yellowish white, finely longitudinally striate and usually with numerous, bright, shining crystals; fracture short, uneven. Odor slight; taste bitter, acrid, becoming pungent.

Unground Southern Xanthoxylum: In transversely curved or irregular, oblong, flattened pieces, or in quills from 2 to 40 cm. in length, bark from 1 to 4 mm. in thickness; outer surface light gray to brownish gray, marked by numerous large barnacle-shaped projections of cork, from 0.5 to 3.5 cm. in thickness and numerous elliptical lenticels; otherwise with grayish patches of foliaceous lichens; inner surface light yellowish brown to olive brown, obscurely longitudinally striate and free from crystals. Odor and taste as in Northern Prickly Ash Bark.

(*b*) *Unground Prickly Ash Berry:* Capsules with short stalks (*Z. americanum*) or without stalk (*Z. Clava-Herculis*); ellipsoidal, fleshy, gray brown, dehiscent; carpels two, convex, apex short-pointed; seeds one or two, oblong black, shining and wrinkled from drying. Taste pungent, warm, aromatic and on chewing leaves a tingling sensation on the tongue; odor when breathed upon, faintly aromatic resembling that of citral.

HABITAT: Zanthoxylum americanum: North America from Canada to Virginia.

Zanthoxylum Clava-Hercules: West Indies and Southern United States from Virginia to Florida and westward as far as Texas.

DISCUSSION: Zanthoxylum americanum is a shrub or small tree. The branches are beset with many short, but very sharp, prickles. The leaves are compound, consisting of four or five pairs of leaflets and a single terminal one. The flowers are of a greenish color, small in size and disposed in sessile umbels.

Zanthoxylum Clava-Hercules is a shrub or small tree. Its protuberances are wart-like, from one-half to an inch in diameter at the base and very short and blunt. Its leaves are compound and consist of from seven to nine pairs of unequal-sided leaflets.

CONSTITUENTS: (*a*) The constituents are similar in the two barks, but not identical. Two resins are present, one crystalline, white and tasteless; the other soft and acrid. This latter constitutes the "xanthoxylin" (resinoid) of the Eclectics. A bitter principle, called "xanthoxyline," probably an alkaloid identical with berberine, is also present.

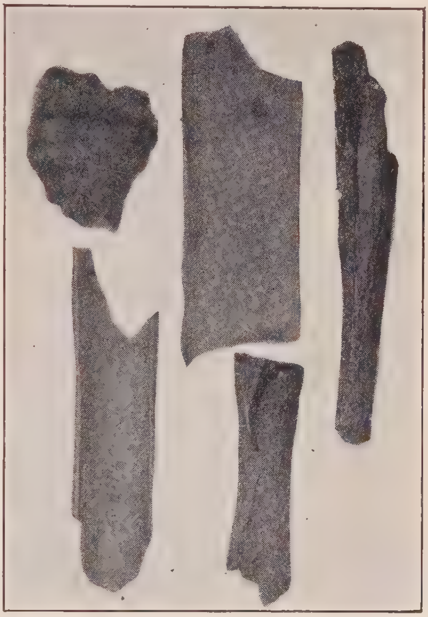


FIG. 52.—Northern prickly ash.

(*b*) The fruit: Volatile oil having a citral-like odor.

PROPERTIES AND USES: (*a*) Xanthoxylum causes an increase in the secretions of the stomach, intestines, pancreas, liver and saliva. It also promotes elimination through increased diuresis and diaphoresis. Thus it is serviceable in myalgia, lumbago, rheumatic and dropsical conditions and is used as an emmenagogue in amenorrhœa, dysmenorrhœa and other female pelvic disorders. When chewed it produces a tingling sensation of the tongue and lips and is used for relieving toothache.

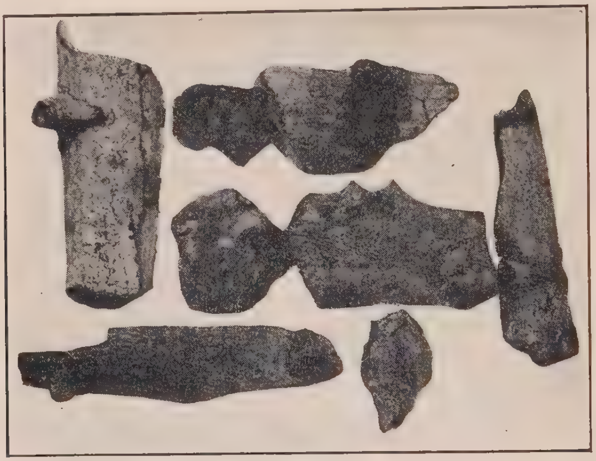


Fig. 53.—Southern prickly ash.

(*b*) Mild aromatic, alterative and tonic. Generally used in combination with other alterative and tonic drugs.

Dose: (*a*) 30 gr. (2 Gm.).
(*b*) 15 gr. (1 Gm.).

Official Preparations: N.F. V.
(*a*) Compound Elixir of Corydalis, 1 fl. dr. (4 cc.).
Compound Elixir of Hydrastis, 1 fl. dr. (4 cc.).
Fluidextract of Xanthoxylum, 30 m. (2 cc.).
(*b*) Compound Fluidextract of Stillingia, 30 m. (2 cc.).
Compound Syrup of Stillingia, 1 fl. dr. (4 cc.).

(*a*) LIMONIS CORTEX

(lĭm′ō̇-nĭs kŏr′tĕks)

LEMON PEEL—U.S.P.

(*b*) LIMONIS SUCCUS

(lĭm′ō̇-nĭs sŭk′ŭs)

LEMON JUICE—U.S.P. VIII

(*c*) OLEUM LIMONIS

(ō′lē̇-ŭm lĭm′ō̇-nĭs)

OIL OF LEMON—U.S.P.

Source: Citrus medica var. Limonum Risso (Hooker filius) (Fam. Rutaceæ).

Etymology: Citrus from the Gr. "kitron," *the citron tree*, named after the town of Kitron in Judea where the tree grew abundantly.

Limonum from the Arabic "limun," or "limu," from the Sanskrit "nimbuka," *the name of the fruit.*

Cortex, the Lat. for *bark.* Strictly speaking, the cortex is that portion of the stem or roots of plants which is external to the vascular tissue and in the perennials is known as the bark when it is modified by the formation of cork which replaces the epidermis.

Succus, the Lat. for *juice.*

Oleum, the Lat. for *oil.*

Part Used: (*a*) Lemon peel: The outer yellow rind of the fresh, ripe fruit.

(*b*) Lemon juice: The freshly expressed juice of the ripe fruit.

(*c*) Oil of lemon: The volatile oil expressed from the fresh peel and yielding not less than 4 per cent of aldehydes of oil of lemon calculated at citral ($C_{10}H_{16}O$).

Description and Physical Properties: (*a*) The outer lemon yellow or dark yellow layer, recently separated by grating or paring; consisting of the epidermis and numerous parenchyma cells containing yellow chromoplastids and large oil reservoirs with globules of the volatile oil; odor fragrant, distinctive; taste aromatic.

(*b*) A slightly turbid, yellowish liquid, having the odor of lemon; taste acid and often slightly bitter.

(*c*) A pale yellow or greenish-yellow liquid, having the characteristic odor and taste of the outer part of fresh lemon peel.

Habitat: The lemon tree is a native of northern India, but is cultivated commercially in nearly all sub-tropical regions.

Discussions: The plants of this genus are small evergreen trees with glossy, shining leaves, fragrant flowers and a large, yellow fruit called a "*hesperidium.*" This name was applied in allusion to the "golden apple" of classical mythology which grew in a certain fabled garden in Africa which was then the western extremity of the known world. This garden was guarded by the Hesperides, the daughters of *Night*, or of Hesperis and Atlas, and also by a dragon. To slay the dragon and collect the apples was one of the labors of Hercules.

In the modern industry of lemon orcharding, only such fruits as are not suitable for the market are used for the recovery of the oil and citric acid. There are several methods of obtaining the oil from the rind, viz., distillation, expression and the écuelle à piquer process. The écuelle process consists of rolling the fruits about in a bowl-shaped vessel called an "écuelle." This vessel is usually made of tinned copper and the concave surface armed with concentric rows of short spikes. These pierce the oil cells of the rind, liberating the oil which flows into the hollow handle of the écuelle. This method produces the finest quality of oil, but is very slow and tedious.

If expression is to be employed, the outer rind is grated from the fruits, placed in bags made of fine cloth and subjected to pressure whereupon the oil flows out. This produces the grade of oil recognized by the pharmacopœia. The oil obtained by distillation is clearer and is less subject to change on standing, since it contains no mucilage, but it contains less of the characteristic, delicate odor of the fruit. Another method of obtaining the oil consists in removing the rind in quarters, flexing it backward so as to rupture the oil cells and collecting the oil in an elephant's ear sponge. In turn the oil is squeezed out of the sponge, allowed to stand for separation to take place and then filtered. This yields a first grade of oil.

An inferior grade of oil can be had by placing the peeled or grated rind in hot water for a time and then skimming off the oil from the surface.

In the statistics on importation, orange peel and lemon peel are grouped under one heading. The figures for both during the year 1924 amounted to 1,992,411 pounds. The amount of oil of lemon imported during the same period was 439,181 pounds. The importation of lemon juice (including lime and sour orange) for the year was 4,158,396 pounds.

Constituents: (*a*) Lemon peel: Besides the volatile oil there is also a glucoside called "*hesperidin*," and a bitter principle.

(*b*) Lemon juice contains from 5 to 6 per cent of citric acid.

(*c*) Oil of Lemon: Two constituents, namely *d*-limonene and phellandrene constitute about 90 per cent of the volume of the oil. The character-giving constituent, the one to which the pleasant and distinctive odor is due is citral, $C_{10}H_{16}O$, which is present to the extent of from 4 to 7 or 8 per cent. Other associated compounds contained in smaller amounts are citronelal, $C_{10}H_{18}O$, and terpenes. Some lemon oils contain traces of geraniol acetate and linalool acetate.

Since limes (Citrus limetta) contain a larger proportion of citric acid than lemons do and as there is less ready sale for them, the greater amount of citric acid of the market has been obtained from that source. In recent years increasing amounts of citric acid have been manufactured from waste lemons grown in California.

PROPERTIES AND USES: On account of the volatile oil and bitter principle present, lemon peel is stimulant and stomachic, and may be employed as a bitter tonic in cases of atonic dyspepsia or where the appetite is poor because of a general run-down condition.

Lemon juice is refrigerant and relieves thirst. This is due to the citric acid present. When sweetened and properly diluted, it forms an agreeable drink in all sorts of febrile and inflammatory conditions. Besides the citric acid present, there are also vitamines which prevent scurvy, pellagra and other nutritional deficiency diseases. Lemons, oranges, limes and lime juice have long been used on board ship, on long cruises into the arctic seas where fresh fruits and vegetables were not to be had for long periods of time, their value having been recognized long before vitamines were discovered.

Oil of lemon is stimulant, carminative and stomachic and is largely used in foods and confections as an agreeable flavor.

DOSE: (*b*) Lemon juice: 1 fl. oz. (30 cc.).
(*c*) Oil of lemon: 1½ m. (0.1 cc.).

OFFICIAL PREPARATIONS: U.S.P. X.
(*a*) Tincture of Lemon (peel).
(*c*) Aromatic Spirit of Ammonia, 30 m. (2 cc.).
Compound Spirit of Orange.

(*a*) AURANTII AMARI CORTEX

(aû-răn′tĭ-ī ȧ-mār′ē kôr′tĕks)

BITTER ORANGE PEEL—U.S.P.

(*b*) OLEUM AURANTII AMARI

(ō′lē̇-ŭm aû-răn′tĭ-ī ȧ-mār′ē)

OIL OF BITTER ORANGE—N.F.

(*c*) OLEUM AURANTII FLORUM

(ō′lē̇-ŭm aû-răn′tĭ-ī flō′rŭm)

OIL OF ORANGE FLOWERS—N.F.

Synonym: (*c*) Oil of Neroli.

Source: Citrus Aurantium Linné (Fam. Rutaceæ).

Etymology: Aurantium from the Lat. "aurum," *gold*, referring to the color of the fruit.

Orange from the Arabic "naranj," or the East Indian "naranja," from the Sanskrit "nagarange," *elephant fruit*.

Citrus from the Gr. "kitron," *citron*.

Amara from the Lat. "amarus," *bitter*.

Part Used: (*a*) Bitter orange peel: The dried rind of the unripe fruit.

(*b*) Oil of bitter orange: The volatile oil obtained by expression from the fresh peel.

(*c*) Oil of orange flowers: The volatile oil distilled from the fresh flowers.

Description and Physical Properties: (*a*) *Unground Bitter Orange Peel:* Thin, irregular bands (ribbons) or quarters; outer surface yellowish- or reddish- or greenish-brown with numerous, minute pits and fine reticulate ridges; inner surface whitish with many slight, conical projections and fine, anastomosing lines formed by the vascular bundles; fracture hard, short; odor fragrant and aromatic; taste aromatic and bitter.

(*b*) Oil of Bitter Orange is a pale yellow liquid, having the characteristic, aromatic odor of the Seville orange, and an aromatic, somewhat bitter taste.

Soluble in 4 volumes of alcohol, the solution being neutral to litmus paper. Also soluble in all proportions in dehydrated alcohol and in an equal volume of glacial acetic acid.

(*c*) Oil of Orange flowers is a pale yellow, slightly fluorescent, neutral liquid, having a distinctive fragrant odor, similar to that of orange blossoms, and an aromatic, at first sweet then somewhat bitter taste.

Habitat: The orange, like the lemon, is a native of northern India, but is now cultivated in most tropical and sub-tropical countries.

DISCUSSION: The trees of this genus are small evergreens, growing from 10 to 20 feet in height. The bitter orange is very similar in its general appearance to the sweet orange, but is perhaps a little more rugged on the surface and of a deeper orange-red color. The rind, flowers and leaves are also a little more aromatic than those of the sweet orange.

Oil of orange flowers, known on the market as "Oil of Neroli," is used chiefly in the perfume industry and as a flavor. The water which distills over with it constitutes the "Orange Flower Water" of the pharmacopœia. It is prepared for the most part in southern France. The importation of oil of orange peel during the year 1924 amounted to 1,992,411 pounds.

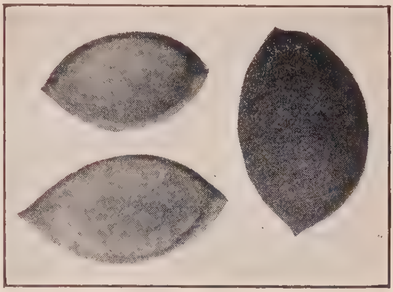


FIG. 54.—Bitter orange peel.

CONSTITUENTS: (*a*) Bitter Orange Peel: Volatile oil; aurantiin, aurantiamarin; aurantiamaric acid; hesperidin.

(*b*) Oil of Bitter Orange Peel: Limonene; citral; citronellal.

(*c*) Oil of Orange flowers: A complex mixture of the terpenes *l*-pinene, *l*-camphene, dipentene, limonene; about 47 per cent of terpene alcohols and their acetates, as *l*-linalool, *d*-terpineol, geraniol and nerol.

PROPERTIES AND USES: Since it is the dried rind of the bitter orange that is used in medicine, much of the volatile oil has been dissipated in the drying process and we must look to the bitter principle for its chief action. Because of this principle, orange peel is a bitter tonic and is used in a number of conditions attended with atonic dyspepsia. There is, however, enough of the aromatic principle remaining to make the drug slightly stimulating and carminative, and these, together with its tonic effect, make it a valuable adjuvant to such drugs as calumba, gentian, quassia and cinchona. These combinations are used for dyspepsia, indigestion and flatulence. Whenever large quantities of orange peel have been ingested, such symptoms as colic and pain in the stomach have supervened, and even convulsions and death have been known to follow. Workmen employed in the handling of the fruit are apt to exhibit such symptoms as nervousness, insomnia and eruptions of the skin, and even muscular spasms have been known to occur.

DOSE: (*a*) Bitter Orange Peel: 15 gr. (1 Gm.).

(*b*) Oil of Bitter Orange: 1½ m. (0.1 cc.).

Official Preparations: U.S.P. X.

(*a*) Bitter Orange Peel:
Tincture of Bitter Orange, 1 fl. dr. (4 cc.).
Compound Tincture of Cinchona, 1 fl. dr. (4 cc.).
Compound Tincture of Gentian, 1 fl. dr. (4 cc.).

N.F. V.

(*b*) Oil of Bitter Orange Peel:
Elixir of Bitter Orange.

(*c*) Oil of Orange Flowers:
Perfumed Spirit.

(*a*) AURANTII DULCIS CORTEX

(aû-răn′tĭ-ī dŭl′kĭs kôr′tĕks)

SWEET ORANGE PEEL—U.S.P.

(*b*) OLEUM AURANTII

(ō′lē-ŭm âu-răn′tĭ-ī)

OIL OF ORANGE—U.S.P.

Source: Citrus Aurantium var. sinensis Linné (Fam. Rutaceæ).

Etymology: Aurantium from the Lat. "aurum," *gold*, referring to the color of the fruit.
Dulcis, the Lat. for *sweet*.
Cortex, the Lat. for *bark*.
Sinensis, the Lat. for "*Chinese*," referring to the habitat.
Citrus from the Gr. "kitron," *citron*.
Oleum, the Lat. for *oil*.

Part Used: (*a*) The fresh outer rind of the ripe fruit.
(*b*) The volatile oil obtained from the fresh peel of the ripe fruit by expression.

Description and Physical Properties: (*a*) *Unground Sweet Orange Peel:* The outer, orange-yellow layer recently separated by grating or paring and consisting of epidermal cells, parenchyma and oil reservoirs with globules of volatile oil; odor highly fragrant; taste pungently aromatic.

The inner, white portion of the rind should not be used.

(*b*) A yellow liquid, having the characteristic odor and taste of the outer part of sweet orange peel.

Habitat: Originally in northern India. Now widely cultivated in tropical and sub-tropical regions.

Discussion: Our supply of oranges comes from California, Florida, the West Indies and southern Europe. The seedless variety known as the "*naval orange*" is rapidly replacing all others in cultivation, but in flavor, sweetness and the amount of juice present, it stands a very poor comparison to the Florida and Mexican seed orange. The "*blood orange*" is a variety of Citrus Aurantium, the characteristics being perpetuated by budding, but as the tree ages, the fruit returns to the normal condition. 1131 pounds of the oil of orange flowers were imported during the year 1924.

CONSTITUENTS: (*a*) Sweet Orange Peel: Volatile oil; hesperidin. (*b*) Oil of Sweet Orange: *d*-limonene ($C_{10}H_{16}$) constitutes about 90 per cent of the oil: small amount of citral and of the methyl ester of anthranilic acid.

PROPERTIES AND USES: While the peel of the sweet orange contains essentially the same constituents as that of the bitter variety, it is used only in the fresh state in which the volatile oil is the dominant constituent. Its use is practically confined to that of an aromatic flavor. It is employed for flavoring purposes generally, also in the manufacture of perfume.

DOSE: (*b*) Oil of (Sweet) Orange: 1½ m. (0.1 cc.).

OFFICIAL PREPARATIONS: U.S.P. X.

(*a*) Of Sweet Orange Peel:
Tincture of Sweet Orange, 1 fl. dr. (4 cc.).
(*b*) Of Oil of Orange:
Compound Spirit of Orange.

OLEUM BERGAMOTTÆ

(ōlē-ŭm bûr′gȧ-mŏt′tē)

OIL OF BERGAMOT—N.F.

SOURCE: Citrus Aurantium Linné var. Bergamia (Risso et Poiteau) Wight et Arnott (Fam. Rutaceæ).

ETYMOLOGY: Bergamot, probably from the Turk. "beg-armudi," literally *prince's pear,* referring to the pear-shaped fruit.

Citrus from the Gr. "kitron," *citron.*

Aurantium from the Lat. "aurum," *gold,* referring to the color of the fruit.

PART USED: The volatile oil obtained by expression from the rind of the fresh fruit containing not less than 36 per cent of ester, calculated as linalyl acetate.

DESCRIPTION AND PHYSICAL PROPERTIES: Oil of Bergamot is a green or greenish-yellow liquid, neutral or only faintly acid, having a characteristic fragrant odor, and an aromatic bitter taste.

Two volumes of the oil, when mixed with 1 volume of alcohol, give a clear solution and this does not become turbid on the further addition of alcohol. It is soluble in 2 volumes of 80 per cent alcohol with not more than a slight cloudiness, and no separation of oil globules. Also soluble in all proportions in glacial acetic acid.

HABITAT: Cultivated in Southern Europe, Asia, Tropical America.

DISCUSSION: According to the official source, the plant yielding oil of bergamot is a variety of Citrus Aurantium. However, some botanists adhere to the idea that it is a hybrid of Citrus Aurantium and Citrus medica. The tree has the general appearance of the orange tree, but the fruit is very small and is non-edible. It has a thick, lemon-yellow rind from which the oil is obtained by cold expression. Sometimes distillation is employed, but the oil is not so good and is not official. The oil, properly recovered, has a greenish- or brownish-yellow color, a bitter, aromatic taste and a very pleasing odor.

CONSTITUENTS: Linalyl acetate, 30 to 40 per cent; linalool; dextro-limonene.

PROPERTIES AND USES: Oil of bergamot is extensively employed in the manufacture of perfume for which it is particularly adapted by reason of its pleasant odor. It was largely used in the manufacture of hair tonics and other external preparations. At present it is used more in "bouquets" or blends.

OFFICIAL PREPARATION: N.F. V.

Perfumed Spirit.

CHAPTER XL

ZYGOPHYLLACEÆ

(zī′gȯ-fĭ-lā′sḗ-ē)

CALTROP FAMILY

This family which is widely distributed in the tropics numbers 18 genera and over 100 species. Its members are distinguished by pinnate or bifoliolate, stipulate leaves and axillary pentamerous flowers.

GUAIACUM

(gwī′ȧ-kŭm)

GUAIAC—N.F.

Synonym: Resin of Guaiac.

Source: Guaiacum officinale Linné and Guaiacum sanctum Linné (Fam. Zygophyllaceæ).

Etymology: Zygophyllaceæ from the Gr. "zygon," a *yoke*, and "phyllon," *a leaf*, i.e., the leaves occur in pairs (yoked together).

Officinale from the Lat. "officina," *a work shop* or *store*, from the Lat. "opus," *work*, and "facere," *to do*, referring to the fact that the drug was kept for sale.

Sanctum, the Lat. for "*holy*," i.e., the plant was thought to possess divinely bestowed healing powers.

Part Used: The resin obtained from the wood.

Description and Physical Properties: In irregular fragments or in large, nearly homogenous masses, occasionally in more or less rounded or ovoid tears, enclosing fragments of vegetable tissues; externally brown, becoming greenish gray brown on exposure, the fractured surface having a glassy luster, the thin pieces being translucent and varying in color from reddish to yellowish brown. The powder is grayish, becoming green on exposure to the air. Odor balsamic; taste slightly acrid.

Habitat: West Indies (Jamaica, Haiti, Cuba), South America.

Discussion: The guaiac tree which is commonly known as "*lignum vitæ*," is quite large, attaining a height of from 40 to 60 feet and a diameter of from 12 to 16 inches. The growth is very slow and the wood, therefore, very hard. The wood is brought to the United States from the West Indies in the form of short logs called "*billets*" (from the Fr. "bille," *a log,* therefore "billette," *a little log*). These are covered with a thick, gray bark which shows on its inner surface, numerous crystals of calcium oxalate.

The heartwood has a specific gravity of about 1.3 and on account of its extreme hardness, is extensively used in making various articles, such as mallets, pulleys and the balls used in bowling alleys; also those used in the game known as "*bowling on the green.*" The chips and raspings formed in the manufacture of these articles are used for the recovery of the resin and were at one time official.

There are several methods employed in South America and the West Indies for the recovery of the resin. One method is to cut the tree into logs about 3 feet in length, boring an auger hole through them lengthwise, then placing one end of the log over a fire and catching the melted resin in a calabash as it flows out. A more common method, however, is to reduce the log to chips which are then boiled in salt water and the resin skimmed off as it rises to the surface. The wood contains about 25 per cent of resin.

Constituents: Guaiaconic acid (alpha resin), 70 per cent; amorphous guaiac beta resin, 10 per cent; gum, 4 per cent; guaiacic acid, 10 per cent.

Properties and Uses: Resin of guaiac was long used as an alterative and was largely employed in rheumatism, gout and syphilitic affections, but is gradually falling into disuse. It is stimulant and expectorant and increases the flow of the saliva and bronchial mucus. Guaiacol ($C_7H_8O_2$) the methyl ether of pyrocatechin, obtained by the distillation of guaiac, is largely employed in the treatment of phthisis and bronchial coughs. Guaiac wood was used in Europe as an alterative as early as 1508.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Compound Gargle of Guaiac.
Tincture of Guaiac, 1 fl. dr. (4 cc.).
Ammoniated Tincture of Guaiac, 30 m. (2 cc.).
Compound Tincture of Guaiac, 1 fl. dr. (4 cc.).

CHAPTER XLI

SIMARUBACEÆ

(sĭm′ȧ-rōō-bā′sė-ē)

QUASSIA FAMILY

These are chiefly tropical or subtropical trees and shrubs. The leaves are alternate and are pinnately compound. Usually both unisexual and hermaphroditic flowers occur on the same plant. The family is closely related to the Rutaceæ, but does not have the oil cells. The fruit is a drupe, a samara or a berry.

QUASSIA

(kwŏsh′ĭ-ȧ)

QUASSIA—U.S.P.

Synonyms: Bitter Wood; Bitter Ash.

Source: (*a*) Picrasma excelsa (Swartz) Planchon, known in commerce as "*Jamaica Quassia,*" and
(*b*) Quassia amara Linné, known in commerce as "*Surinam Quassia*" (Fam. Simarubaceæ).

Etymology: Quassia from "Quassy," the name of a Surinam negro slave who, it is said, first discovered the febrifuge properties of the wood about the year 1730.

Picrasma from the Gr. "pikros," *bitter*, referring to the taste of the wood.

Excelsa from the Lat. "excelsus," *surpassing*, i.e., the tallest species in the genus.

Amara from the Lat. "amarus," *bitter*, referring to the taste of the wood.

Part Used: The wood.

Description and Physical Properties: *Unground Jamaica Quassia:* Usually in chips, raspings or shavings, occasionally in billets; yellowish white or bright yellow, with a few light gray pieces; somewhat coarsely grained; fracture tough, fibrous; odor slight; taste very bitter.

Unground Surinam Quassia: Resembles Jamaica Quassia except that the billets are usually thinner, the tracheæ single or in pairs and smaller, the medullary rays usually 1 to 2 cells wide and from 10 to 30 rows deep, and the calcium oxalate crystals few or entirely absent.

HABITAT: (*a*) West Indies (Jamaica, Antigua, St. Vincent).
(*b*) West Indies, Brazil, Guiana, Colombia, Panama.

DISCUSSION: Picrasma excelsa is a tall tree growing 100 or more feet in height and with a straight, tapering trunk 2 or 3 feet in diameter. The leaves are compound, the leaflets occurring in pairs, except the single one at the end of the petiole. The flowers occur in panicles, each composed of many, small, yellowish-green flowers. The fruit is a small, black drupe the size of a pea.

Quassia amara is a shrub or small tree with many branches. Its leaves are compound, consisting of two pairs of leaflets and an odd one at the end of the petiole. The flowers are of a bright, red color and occur in long racemes at the ends of the branches. The fruit consists of a two-celled capsule containing globular seeds.

Quassia wood is imported from Jamaica and enters New York in the form of short logs or "*billets.*" It is a strong, tough wood, nearly white when fresh, but acquiring a yellowish color on exposure. It is usually found in the drug trade in the form of chips or raspings. Quassia cups are turned from the wood and are employed medicinally as drinking cups, the water gradually extracting the medicinal properties of the wood. In the year 1924, 853,547 pounds of quassia were imported.

CONSTITUENTS: Picrasmin (quassiin), a white, crystalline, neutral substance; resin; mucilage; pectin. The Surinam quassia also contains a trace of tannin, as may be detected by its giving a black or bluish-black color with the salts of iron.

PROPERTIES AND USES: Quassia is a simple bitter and tonic. It finds its greatest use in those forms of dyspepsia characterized by loss of appetite, gastric vertigo and constipation due to a general atonic condition. It also possesses some febrifuge properties and is used as an anti-malarial. An infusion of quassia, used as an enema, is a very effective anthelmintic against the threadworm and ascarides of the lower bowel. For this purpose it may be injected in quantities of a pint or more and will generally bring away the parasites in a stupefied condition. An infusion is often used to kill house flies.

DOSE: 8 gr. (0.5 Gm.).

CASCARA AMARGA
(käs′kȧ-rä ä-mär′gä)

CASCARA AMARGA—N.F.

SYNONYM: Honduras Bark.
SOURCE: An undetermined species of Picramnia (Fam. Simarubaceæ).
ETYMOLOGY: Cascara is the Spanish for *bark*.

Amarga is the Spanish for *bitter*, from the Lat. "amarus," *bitter*, i.e., *bitter bark*.

Picramnia, from the Gr. "pikros," *bitter*, and "thamnos," *bush*.

PART USED: The dried bark containing not more than 2 per cent of foreign organic matter.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Cascara Amarga:* In quills up to 50 cm. long and 3 cm. in diameter; bark up to 8 mm. thick, sometimes in broken, irregular, flattened or transversely curved pieces; externally yellowish brown, more or less covered with grayish lichens showing blackish apothecia, longitudinally fissured and roughened with cork layers, or with cork more or less removed and reddish brown; inner surface grayish brown to dark reddish brown, with irregular longitudinal striations and numerous minute transverse markings; internally dark brown with a light yellow zone beneath the cork and numerous yellowish groups of stone cells, the latter especially pronounced in the older bark; fracture short, hard and brittle. Odor faint; taste extremely bitter and persistent.

HABITAT: Mexico, Central and South America, West Indies.

DISCUSSION: Honduras bark has long been known in Tropical America as a tonic and alterative, but has attracted limited attention in the United States. It reaches our market in very small volume in the form of large quills varying from ½ to 1½ inches in diameter and sometimes as much as 18 or 20 inches in length.

CONSTITUENTS: Little is known of the constituents of Cascara amarga beyond the fact that it contains a bitter, amorphous substance, probably of alkaloidal nature.

PROPERTIES AND USES: This bark acts as a bitter tonic much the same as quassia. Claims of alterative properties have been made.

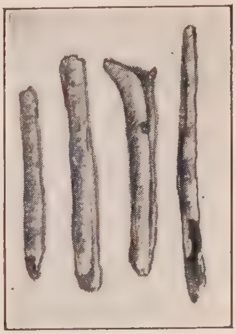


FIG. 55.—Cascara amarga. ⅓ natural size.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATIONS: N. F. V.

Compound Fluidextract of Trifolium, 1 fl. dr. (4 cc.).
Compound Syrup of Trifolium, 2 fl. dr. (8 cc.).

CHAPTER XLII

BURSERACEÆ

(bûr′sē̇-rā′sē̇-ē)

MYRRH FAMILY

These are tropical shrubs or trees with pinnate leaves, small flowers, and dry fruits with a husk splitting into valve-like segments. They yield a variety of commercial gums, balsams and oils.

MYRRHA

(mûr′rȧ)

MYRRH—U.S.P.

Source: Commiphora Myrrha (Nees), Baillon, or other species of Commiphora (Fam. Burseraceæ).

Etymology: Myrrha from the Gr. "myron," *balsam*, and "rheiin," *to flow.*

Commiphora from the Gr. "kommi," *gum*, and "pherein," *to bear*, i.e., gum-bearing.

Burseraceæ, named for Joachim Burser, a German botanist of Naples, 17th century.

Part Used: The gum resin.

Description and Physical Properties: *Unground Myrrh:* Rounded or irregular tears or masses of agglutinated tears, brownish yellow or reddish brown and more or less covered with a grayish or yellowish dust; fracture waxy, granular, conchoidal, internally deep yellowish or reddish brown, sometimes marked with nearly white spots or lines, oily, translucent at the edges; odor balsamic, aromatic; taste aromatic, bitter and acrid.

Habitat: Nubia, Somaliland, Arabia.

Discussion: The tree from which this drug is obtained is small, having a stunted appearance and with rough, abortive branches terminating in sharp spines. The gum resin has a very old history, having been used in religious ceremonies and embalming since the remotest times. Thus it was among the presents brought by the "Wise Men of the East" to Bethlehem and presented to the infant Jesus. It was an ingredient of the "holy oil" used in the Jewish ceremonial as laid down by Moses. It is still used in the incense employed by certain religious denominations. Edward I presented gold, frankincense and myrrh at the ceremonial of the Feast of the Epiphany and this practice is still observed by the monarchs of Great Britain at this annual service. During the year 1924, 23,865 pounds of myrrh were imported.

CONSTITUENTS: Gum, 40 to 55 per cent; resin, about 35 per cent; volatile oil, 2 to 6 per cent; a bitter glucoside called "*myrrhin.*"

PROPERTIES AND USES: Myrrh possesses antiseptic and stimulating properties and for that reason is used in mouth washes and dentifrices of various types. Applied locally in solution to a mucous membrane it affords protection and tends to allay inflammation. It has been used as a diuretic, expectorant and diaphoretic, also in the treatment of bronchitis and as a mild irritant in skin diseases.

DOSE: 8 gr. (0.5 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Tincture of Myrrh, 30 m. (2 cc.).

CHAPTER XLIII

ANACARDIACEÆ

(ăn′ȧ-kär′dĭ-ā′sė̇-ē)

SUMAC FAMILY

This is a widely distributed family, numbering about 50 genera and 400 species. It is mostly confined to the tropics and subtropics. It consists of trees and shrubs (sometimes climbing). The genus "Rhus," sometimes called the "*Rhus Family*," has several representatives in the United States. These species are characterized by having compound leaves and small, greenish-white or yellow flowers occurring in terminal panicles. All members of the family have resin canals. In many species the juice is milky and is sometimes very poisonous.

MASTICHE

(măs-tĭsch′ĕ)

MASTIC—N.F.

Synonyms: Gum Mastic; Mastix.

Source: Pistacia Lentiscus Linné (Fam. Anacardiaceæ).

Etymology: Mastiche and mastic from the Gr. "mastichaein," *to chew or masticate*, referring to its use in the East as an ingredient of chewing gums.

Pistacia from the Gr. "pistake," from the Persian "pistah," which, in turn, came from the Arabic "foustag" or "fistaq," the name of the pistachio tree.

Lentiscus from the Lat. "lens, lentis," *a lenticel*, i.e., having elliptical cavities in which the resin is secreted.

Anacardiaceæ from the Gr. "ana," *similar to*, and "kardia," *heart*, from a fancied resemblance of the fruit to the shape of a bird's heart.

Part Used: The concrete resinous exudation.

Description and Physical Properties: In sub-globular, lenticular, elongated or pear-shaped tears, about 3 mm. in diameter, pale yellow or greenish yellow, transparent, having a glass-like luster, the surface sometimes very slightly dusty; brittle, becoming plastic when chewed. Odor slight, balsamic; taste mild, terebinthinate.

Habitat: Mediterranean basin and islands, especially Chios (Scio), France, Spain, Morocco, Turkey, Syria. Also the Canary Islands.

Discussion: The plant supplying this product is a shrub or small tree. It has compound leaves, each consisting of from 8 to 12 leaflets. The two upper leaflets are opposite, but the others are alternately arranged along the petiole. The flowers are very small, the pistillate and staminate ones occurring on separate plants. A fixed oil expressed from the fruit is used by the Arabs of North Africa both as an article of diet and for lighting purposes. Most of the commercial product is obtained from the Island of Chios in the Grecian archipelago. Incisions are made in the trunk and larger branches. The juice exudes from these and either hardens in drops upon the bark or falls to the ground where it is collected in receptacles placed there for that purpose. The importation of mastic in 1924 was 32,485 pounds.

Constituents: Volatile oil, 1 to 2 per cent; alpha resin (masticic acid), 80 to 90 per cent; beta resin (masticin), 10 to 20 per cent.

Properties and Uses: Mastic is a mild stimulant, but is used more in the arts than in medicine. It enters into incense, putty, shellac, varnish and into a number of preparations for the gums and teeth which it is claimed to preserve. It is dissolved in oil of turpentine to form a varnish for covering charts and maps.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.
Pills of Aloe and Mastic, 2 pills.
Compound Chloroformic Solution of Mastic.

RHUS GLABRA

(rŭs glȧ′brȧ)

RHUS GLABRA—U.S.P.

Synonyms: Shoemake; Sumac; Sumach; Mountain Sumach; Dwarf Sumach; Sleek Sumach; Smooth Sumach; Upland Sumach; Scarlet Sumach; Vinegar Tree.

Source: Rhus glabra Linné (Fam. Anacardiaceæ).

Etymology: Rhus from the Gr. "rhous," the name of the plant, from the Celtic "rhudd," *red*, referring to the color of the ripe fruit.

Glabra from the Lat. "glaber," *smooth*, because of the smoothness of the bark.

Sumach and its various modifications come from the French "sumac," formerly "sumach") Sp. "zumaque"), from the Arabic "summaq," the name of the plant.

PART USED: The dried, ripe fruit.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Rhus Glabra:* Flattened ovoid, nearly golbular or somewhat reniform; from 3.5 to 5.5 mm. in length, nearly as broad, but usually somewhat less in thickness; a raised scar at the apex and the five-parted calyx occasionally with a short pedicel at the base; externally dark red, velvety with short hairs; endocarp smooth, shiny, crimson to yellowish-red; 1-locular, 1-seeded; seed brown, very hard; inodorous; taste acidulous and astringent.

HABITAT: Canada and nearly all parts of the United States.

DISCUSSION: This plant is a shrub, growing from 2 to 12 feet in height, depending on the soil and climate. The stems are usually more or less bent. The branches are numerous and straggling. The leaves are compound and consist of numerous pairs of opposite leaflets arranged upon a smooth petiole with an odd one at the extremity. They are a deep green during the summer, but in autumn their color changes to a deep red or yellow. The flowers are greenish red, and arranged in large, erect, terminal panicles which are pyramidal in shape. Later in the season these panicles become great clusters of fruits, each individual of which is a little drupe covered with a crimson down. Because of the great beauty of the sumach, it is largely employed in landscape gardening. The importation of sumach during the year 1924 amounted to 4919 tons. During the same period 22,023 pounds of the extract were imported.

CONSTITUENTS: The fruit contains calcium malate, malic, tannic and gallic acids, fixed oil and a red coloring matter. The bark and leaves are very astringent and are largely employed in the tanning of leather and in the dye industry. Sumach is cultivated in Virginia for the manufacture, from the bark and leaves, of an extract for tanner's use, the output reaching several thousand tons annually.

PROPERTIES AND USES: Sumach fruit is a pleasant-tasting astringent and refrigerant. The astringent properties are due to the tannic and gallic acids present, and suggest its use as a gargle and mouth wash in tonsilitis, pharyngitis, spongy gums and other mouth affections.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Fluidextract of Rhus Glabra, 15 m. (1 cc.).

CHAPTER XLIV

SAPINDACEÆ

(săp′ĭn-dā′sē̇-ē)

SOAPBERRY FAMILY

This family, numbering about 118 genera and more than 1000 species, consists for the most part of tropical trees and shrubs, or rarely herbaceous, woody vines. Many of the species contain the glucoside "saponin" which has the property of producing a foam with water, and have, for that reason, been used as soap substitutes.

GUARANA

(gwä-rä′nȧ)

GUARANA—N.F.

Synonyms: Brazilian Cocoa; Guarana Bread.

Source: Paullinia Cupana Kunth (Fam. Sapindaceæ).

Etymology: Guarana from "Guaranis" the Brazilian name for a tribe of South American Indians in whose territory the plant grows.

Paullinia, in honor of the German botanist of that name (1643–1712).

Cupana from the name of an Italian monk and botanist, Francis Cupani (d. 1710).

Sapindaceæ from "sapindus," a contracted form of the Lat. "sapo," *soap*, and "indicus," *Indian*.

Part Used: A dried paste consisting chiefly of the crushed seeds. The N.F. requires that it yield not less than 4 per cent of caffeine.

Description and Physical Properties: *Unground Guarana:* Usually in cylindrical sticks, about 3 to 5 cm. in diameter, externally dark reddish brown; hard and heavy; fracture uneven, often fissured in the center; internally pale reddish brown, showing more or less coarse fragments of seed and occasionally their blackish-brown seed-coats. Odor slight; taste slightly astringent and bitter.

Habitat: Brazil, Guiana, Venezuela.

Discussion: This plant is a woody, climbing vine, very abundant in the northern and western provinces of Brazil. The fruit is a three-celled, coriaceous capsule containing three seeds which resemble small buckeyes. The product is prepared exclusively by the Guaranis Indians who, after removing the seeds from their capsules, roast them for half a day over a fire, then place them in bags and beat them with sticks in order to remove the shells. The kernels are then crushed in crude stone mortars and formed into a paste by the admixture of a little water. After kneading the paste sufficiently, it is molded by hand into cylindrical or globular masses which are then dried in the sun or by a slow fire.

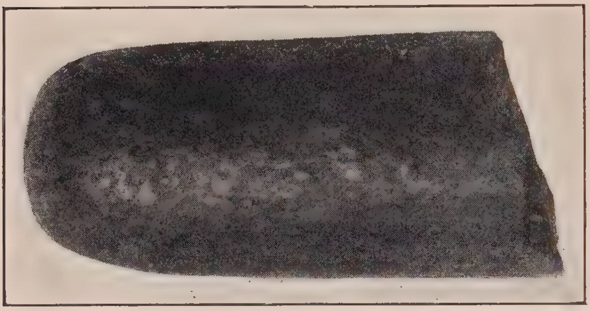


Fig. 56.—Guarana.

Constituents: Caffeine (originally called guaranine); theobromine; tannin; fixed oil.

Properties and Uses: Guarana is used in Brazil as a beverage, much the same as tea and coffee are in this country. It is also employed as a food by the native Indians of that country who mix it with cassava (the starch from the rootstalks of the cassava plant, used as food and in making tapioca and cassava bread) or chocolate. Medicinally it is used as a nervine and stimulant in the same way that kola and caffeine are used.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Elixir of Guarana, 1 fl. dr. (4 cc.).
Elixir of Guarana and Celery, 2 fl. dr. (8 cc.).
Fluidextract of Guarana, 30 m. (2 cc.).

CHAPTER XLV

THEACEÆ

(thē-ā′sė-ē)

TEA FAMILY

A FAMILY of trees and shrubs having alternate undivided leaves, large regular pentamerous flowers and a fleshy or capsular fruit. There are 16 genera and about 175 species, mainly tropical, but widely distributed.

THEA

(thē′ȧ)

TEA

SYNONYMS: Black Tea; Green Tea.

SOURCE: Thea sinensis Linné (Fam. Theaceæ).

ETYMOLOGY: Thea from the Gr. "thea," *a goddess,* i.e., it was regarded as a divine herb.

Sinensis (Chinensis) the Lat. for *Chinese,* i.e., of or belonging to China, referring to its habitat.

PART USED: The dried leaves.

HABITAT: China, India, Japan.

DISCUSSION: The tea plant is an evergreen shrub or small tree growing from 6 to 30 feet in height but kept down by pruning to not over 5 feet. It is raised from the seed and becomes productive when about three years old. In China large fields of tea are planted in regular rows, while in Japan it is used as a hedge or fence to separate the fields. There are ordinarily three harvests of the leaves each year, February, April and June; the first, or February picking, being the best and the June picking the poorest.

The picking of the leaves, especially the unopened leaf-buds, requires care and cleanliness. Women and children do the collecting. It is claimed that those who collect the first grades of tea are trained to this task from childhood and that they are forbidden to eat of fish, onions or of any other food that might affect the aroma of the tea. Besides they must take a daily bath and must not pick with the naked fingers but with gloved hands. The finest teas are considered fit only for royalty, command a price as high as $75 to $100 per pound and seldom, if ever, leave the country in which they are produced.

The value of a tea depends upon the aroma of the leaf which in turn depends largely upon its age, the young leaf-buds being greatly superior.

At one time it was held that green and black tea were produced from different plants but such is now known not to be the case. Generally, but one kind is produced on a given plantation.

Black Tea. The carefully sorted fresh leaves are first wilted, the best in the shade, others in the sun, for from a few hours to one day. During this time the leaves are rubbed between the hands to facilitate wilting. The object of the wilting is to get the leaves in such a condition that they may be rolled without breaking. The fresh leaves are crisp and when compressed in the hand they crack. They are then roasted in iron pans over charcoal fires, and next strongly rolled between the hands into little cylinders or balls, after which they are again alternately roasted and rolled until practically dry and finally completely dried in baskets over charcoal fires.

In Japan and India the coolies wilt the leaves by kneading them. They are then tightly packed into baskets, covered and set aside to undergo a process of fermentation. When, after twenty minutes to seven hours, this process is completed, the leaves exhibit a copper color. They are again rolled and dried over charcoal fires.

This fermentation or sweating process develops the volatile oil which gives the tea its odor and aroma, destroys the tannin, a bitter and astringent principle, and imparts the dark or almost black color to the tea.

Green Tea. The leaves immediately after picking are steamed so as to retain the green color. This requires about half a minute. The moist leaves are thrown into deep strongly heated pans, stirred with the hands, roasted and rolled. Green teas are less aromatic and more astringent than black teas.

Chinese teas are more aromatic than Ceylon or Indian teas because a lower temperature is used in roasting.

Modern machinery is rapidly replacing the old methods of curing tea. However, there is at the present time on the market a brand of tea in which the flowers are present. This is perhaps something of a novelty, but is quite popular for special social occasions.

CONSTITUENTS: Caffeine, formerly known as "*theine*," is the most important constituent of tea and is present in from 1 to 5 per cent.

Tannin is present in from 11 to 21 per cent, and volatile oil to the extent of from 0.6 to 1 per cent. 92,772,890 pounds of tea were imported in 1924.

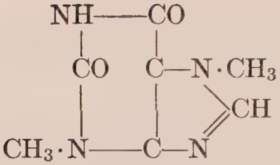
Properties and Uses: The hot infusion, commonly called "*tea,*" is one of the best diuretics known. It markedly increases the amount of urine secreted as well as that of its solid constituents. Its almost universal use as a beverage is well known. It is also employed in dropsies, nephritis and cardiac affections.

The alkaloid caffeine is widely distributed in nature, occurring in quite an unusual number of plants which, in turn, belong to different families and grow in widely separated geographical areas. Its presence has been established definitely in:

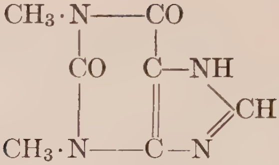
	Family
Tea	Theacæ
Coffee	Rubiaceæ
Kola	Sterculiaceæ
Guarana	Sapindaceæ
Cacao	Sterculiaceæ
Maté	Aquifoliaceæ

At first glance it seems strange that parts of these plants have been chosen from the many at hand for the preparation of mildly stimulating beverages. It does not appear likely that the various savage peoples living remote from one another, having no means of communication with one another and with no knowledge of the constituents of these or other plants, could have learned from one another to select products physically so dissimilar but having a common active constituent and to use them for the same purpose. This fact almost compels the belief that men are guided largely by instinct or empirical selection which, as science develops, proves to have some foundation in fact.

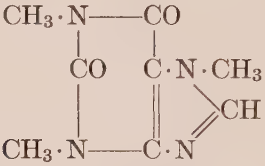
Caffeine, theobromine and theophylline are chemical compounds of xanthine. In order to make the relationship more clear the structural formulas of these alkaloids are shown below. All of them can be made synthetically and all find more or less extensive use in medicine. All of them are diuretic, caffeine having the weakest action in this respect and theophylline the most powerful.



Theobromine
(Dimethylxanthine)



Theophylline
(Dimethylxanthine)



Caffeine
(Trimethylxanthine)

CHAPTER XLVI

FLACOURTIACEÆ

(flȧ-ko͞or′tĭ-ā′sḗ-ē)

FLACOURT FAMILY

This family of plants was named in honor of Etienne de Flacourt, a French governor of Madagascar in the seventeenth century. It consists chiefly of tropical trees and shrubs, formerly included in the Bixaceæ, but now distinguished from them by the unisexual flowers and straight embryo. The family contains 70 known genera, several of which yield products of important economic value.

OLEUM CHAULMOOGRÆ

(ō′lḗ-ŭm chôl-mo͞o′grē)

CHAULMOOGRA OIL—U.S.P.

Synonym: Chaulmugra Oil.

Source: Taraktogenos Kurzii King (Fam. Flacourtiaceæ). The Pharmacopœia states that: "The fixed oil from the seeds of certain species of Hydnocarpus, when designated as such and when agreeing in physical and chemical characters with Chaulmoogra Oil, may be used in its place.

Etymology: Chaulmoogra is the native East Indian name of the plant.

Part Used: The fixed oil expressed from the seeds.

Description and Physical Properties: A yellow or brownish-yellow liquid, or, at temperatures below about 25° C., a whitish, soft solid. It has a characteristic odor, and a somewhat acrid taste.

Chaulmoogra Oil is sparingly soluble in alcohol; soluble in benzene, chloroform, ether, and in petroleum benzin.

Habitat: Southeastern Asia.

Discussion: The seeds from which chaulmoogra oil is obtained vary from an inch to an inch and a quarter in length. They are more or less angular and flattened from compression within the fruit. The oil when obtained by expression, which is the usual method, yields from

25 to 30 per cent of the weight of the seeds. It is claimed, however, that 50 per cent may be extracted with ether.

Chaulmoogra oil is yellowish or brownish yellow in color and has a characteristic odor and taste. It is liquid at temperatures above 25° C., but solidifies to a soft, whitish solid on cooling below that temperature. Its specific gravity is about 0.950 at 25° C.

CONSTITUENTS: Chaulmoogra oil consists of the glycerides of several organic acids of which the important ones are chaulmoogric acid, $C_{18}H_{32}O_2$, and hydnocarpic acid, $C_{16}H_{23}O_2$.

PROPERTIES AND USES: Chaulmoogra oil, and esters made from it, are without doubt the most useful remedies for leprosy known. For this purpose it is used both internally and externally. Authorities seem to be fairly agreed that in many cases it will effect complete recovery if taken in time. The oil may be administered in the form of a soap which affects the gastro-intestinal tract less than the oil itself. The unpleasant effects caused by the persistent oral use are claimed to be obviated by adminstering the esters of the pure acids instead of the oil itself. Many recent writers advocate the intramuscular injection of the synthetic esters. The oil itself has found extensive use as an external counter-irritant application for bruises, sprains, wounds, sores and various inflammations.

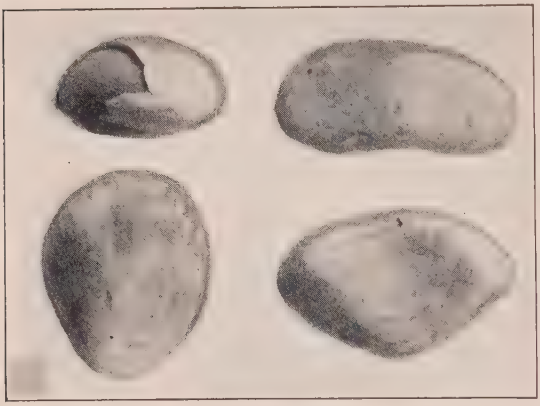


FIG. 57.—Chaulmoogra seeds.

DOSE: 15 m. (1 cc.).

CHAPTER XLVII

POLYGALACEÆ

(pŏl′ĭ-gȧ-lā′sḗ-ē)

MILKWORT FAMILY

THIS is a large family numbering 10 genera and nearly 700 species. The tropical members are trees and shrubs, while those of the temperate regions are mostly herbs. The family name may be, to a certain extent, misleading since the plants do not possess milky secretions. The name is derived from the Gr. "polys," *much*, and "gala," *milk*, and is supposed to have been given because of the theory that the plants increased the secretion of milk in animals feeding upon them.

SENEGA

(sĕn′ḗ-gȧ)

SENEGA—U.S.P.

SYNONYMS: Snakeroot; Senega or Seneca Snakeroot; Rattlesnake Root; Milkwort; Mountain Flax.

SOURCE: Polygala Senega Linné (Fam. Polygalaceæ).

ETYMOLOGY: Senega from "Seneca," a tribe of North American Indians who used the plant as a remedy in cases of snake bite. This use of the plant also accounts for most of the other common names.

Polygala from the Gr. "polys," *much*, and "gala," *milk*, i.e., the plant was supposed to be a galactagogue.

PART USED: The dried roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Senega:* Usually in pieces; when entire, slenderly conical, with an enlarged crown; from 3 to 15 cm. in length and from 2 to 10 mm. in thickness; tortuous, somewhat branched and bearing a few rootlets; crown knotty with numerous buds and short stem-bases; externally brownish yellow, the crown darker and rose-tinted; longitudinally wrinkled, frequently with a distinct ridge or keel; fracture short, wood pale yellow; odor suggesting methyl salicylate; taste sweetish, afterwards strongly acrid.

HABITAT: Southern Canada and the United States east of the Rocky Mountains.

Discussion: This is a perennial, herbaceous plant, the root of which sends up, each year, several erect, leafy stems, seldom more than a foot in height. The stems are usually tinged with red or purple below, but are green near the top. The small, white flowers form a close spike at the top of the stem. The fruit is a small two-celled capsule, each cell containing a small silky black seed. The root is several inches in length with a large, knotty crown upon which the purplish scales of the stem are often found.

The root has a peculiar morphological feature consisting of a keel which extends, like a shrunken sinew, down one side, on the outside of the root. It really represents a one-sided development of the liber tissue. Frequently also the woody cylinder of the root has a segment of the woody tissue missing, the space being filled with parenchymatous tissue. When this condition occurs, the missing woody tissue is always on the opposite side from the keel. The reason for this peculiar formation is not known.

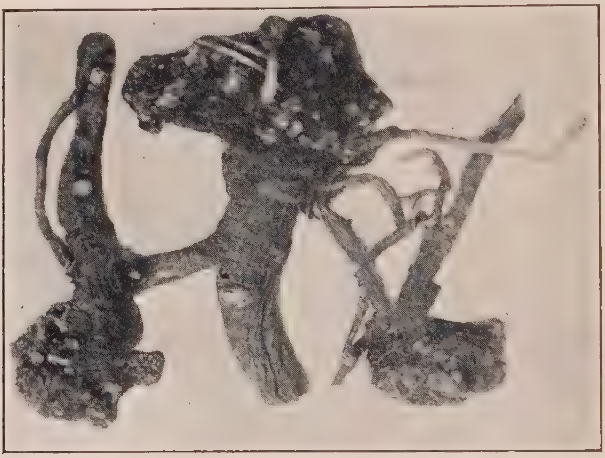


Fig. 58.—Senega.

Constituents: A saponin-like body, 5 to 6 per cent. It is composed of senegin and polygalic acid. Fixed oil, 8 to 9 per cent; volatile oil; methyl salicylate (increasing with age); resin; pectin; albuminoids.

Properties and Uses: Senega is used as a stimulating expectorant and emetic in the chronic and subacute stage of bronchitis. In such cases it stimulates the tissues and promotes expectoration. It is of no value in those forms of bronchitis in which the mucus is scanty and tough. It is employed as a stimulating expectorant in asthma and spasmodic croup.

Dose: 15 gr. (1 Gm.).

Official Preparations: U.S.P. X.
Fluidextract of Senega, 15 m. (1 cc.).
Syrup of Senega, 1 fl. dr. (4 cc.).
Compound Syrup of Squill, 30 m. (2 cc.).

CHAPTER XLVIII

CELESTRACEÆ

(sĕl′ĕs-trā′-sė̄-ē)

STAFFTREE FAMILY

This family, numbering about 350 species and consisting of trees, shrubs and woody vines, is widely distributed over the earth. The plants have simple leaves, small regular flowers and dehiscent fruits, usually with a reddish arillode enclosing the seeds.

EUONYMUS

(ū̇-ŏn′ĭ-mŭs)

EUONYMUS—N.F.

Synonyms: Wahoo; Burning Bush; Spindle Tree.

Source: Euonymus atropurpureus Jacquin (Fam. Celestraceæ).

Etymology: Euonymus, literally *a good name*, from the Gr. "eu," *well* or *good*, and "onoma," *name*, signifying *well known*.

Atropurpureus from the Lat. "ater," *dark*, and "purpureus," *purplish-red*, referring to the color of the flowers and fruit.

Part Used: The dried bark of the roots.

Description and Physical Properties: *Unground Euonymus:* Usually in transversely curved pieces, occasionally in single quills from 2 to 7 cm. long; bark from 1 to 4 mm. thick; very light in weight; outer surface grayish or light brown somewhat wrinkled, with soft scaly cork and transverse lenticels, the latter occasionally forming fissures; inner surface grayish white, longitudinally striate and somewhat porous; fracture short with projecting, silky, elastic fibers of a caoutchouc-like substance. Odor distinct; taste bitter and acrid.

Habitat: Eastern United States and Canada.

Discussion: This is a tall, erect shrub with opposite, serrated leaves and small, dark-red flowers (hence the name "burning bush") arranged in loose cymes on axillary peduncles. The fruit is 3- to 5-lobed and possesses a red arillode. The plant is frequently cultivated for its beauty.

Constituents: Euonymin, a resinous body of bitter taste; atropurpurin; volatile oil; asparagin; resins.

Properties and Uses: Euonymus is a laxative, resembling podophyllum, colocynth or rhubarb in action, though milder.

In this connection it is well to call attention to the caution noted in the N.F. regarding the dose of this drug.

> *Caution:* It has been stated that the absorption of Euonymus in the gastro-intestinal tract is uncertain and irregular. To avoid possible toxic or cumulative action of the drug the physician should determine in each case the tolerance of the patient and regulate the dosage accordingly.

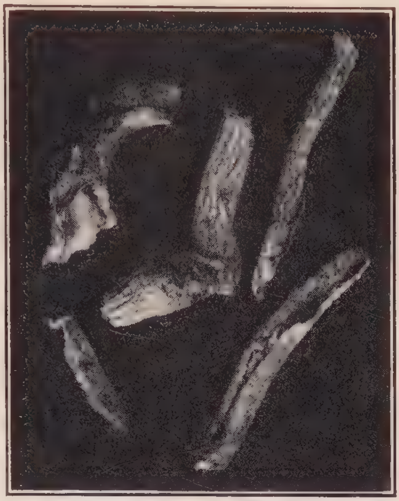


Fig. 59.—Euonymus.

Dose: 8 gr. (0.5 Gm.).

Official Preparations: N.F. V.

Extract of Euonymus, 2 gr. (0.125 Gm.).
Fluidextract of Euonymus, 8 m. (0.5 cc.).

CHAPTER XLIX

RHAMNACEÆ

(răm-nā′sė̄-ē)

BUCKTHORN FAMILY

This is a widely distributed family, numbering about 500 species and consisting of trees, shrubs and woody climbers. The leaves are mostly simple and stipulate, the flowers small and regular and the fruit a drupe or capsule. The branches of some species possess stout thorns, hence the name of the family.

CASCARA SAGRADA

(käs′kȧ-rä sä-grä′dä)

CASCARA SAGRADA—U.S.P.

Synonyms: Cascara; Rhamnus Purshiana; Sacred Bark; Holy Bark.
Source: Rhamnus Purshiana De Candolle (Fam. Rhamnaceæ).
Etymology: Cascara is the Spanish for *bark*.
Sagrada is the Spanish for *sacred* or "*holy*."
Rhamnus from the Gr. "rhamnos," *buckthorn*, from the Celtic "ram," *a tuft of thorns*, referring to the thorny character of the tree.
Purshiana, given in honor of the famous botanist, Frederick Pursh (1774–1820).
Part Used: The dried bark of the trunk and branches.

Description and Physical Properties: *Unground Cascara Sagrada:* Usually in flattened or transversely curved pieces, occasionally in quills; bark from 1 to 5 mm. in thickness; outer surface dark brown or brownish red, longitudinally ridged, with grayish or whitish lichen patches, sometimes with numerous lenticels and occasionally with moss; inner surface longitudinally striate, light yellow to dark reddish brown or dark brown in old matured bark; fracture short with projections of bast-bundles in the inner bark; odor distinct; taste bitter and slightly acrid.

Habitat: The northwestern portion of the United States and southwestern British Columbia.

Discussion: This is a small tree, growing some 20 feet in height.

The leaves are from 2 to 7 inches in length and from 1 to 3 inches wide. The flowers are rather larger than in most members of this genus and are arranged in umbellate cymes. The fruit is a black, 3-seeded berry. The fresh bark is said by some to be griping while the statement is denied by others. A fluidextract prepared from a sample of perfectly fresh bark and tested on a number of chemists was found to cause no griping. The bark often can be identified by the presence of a grayish lichen on its surface. In fact several species of lichen are peculiar to this bark. The greater portion of this lichen or "moss" is removed by washing and passing the bark through a machine devised for this particular purpose.

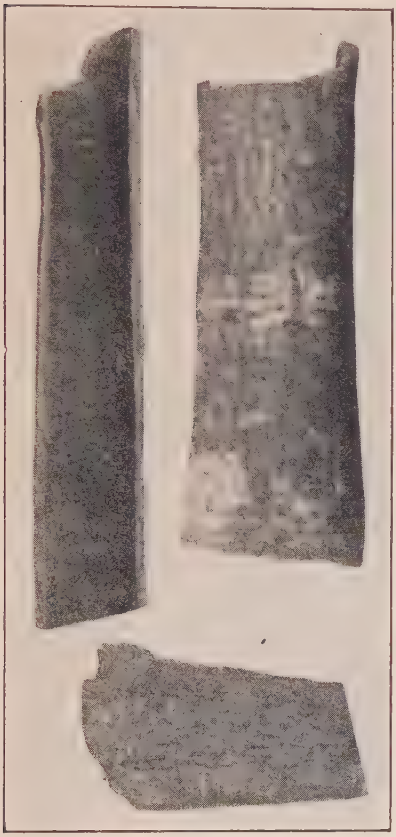


Fig. 60.—Cascara Sagrada.

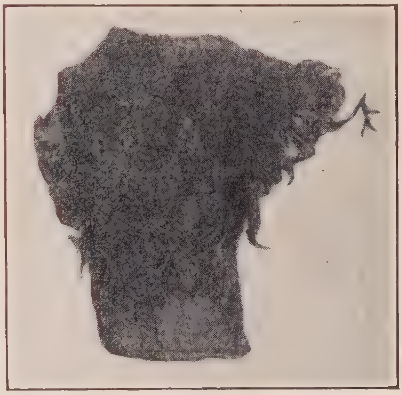


Fig. 61.—Cascara Sagrada with moss attached.

Constituents: Purshianin, a glucoside which, on decomposition, yields emodin; cascarin; chrysarobin; chrysophanic acid. A bitter principle is also present which is claimed to be inert and can be removed by the use of magnesium oxide as is done in making the aromatic fluidextract.

Properties and Uses: Cascara is the tonic laxative *par excellence.* Being bitter, it acts as a stomachic. Its principal usefulness is in the correction of habitual constipation, since it is effective when taken over considerable periods of time without requiring increased doses. In many such cases it may be withdrawn entirely after proper natural tone has been reëstablished.

Cascara and its preparations seem to be most effective when used in the smallest practicable dose, diluted with a large volume of water. It produces its laxative effects in 8 to 10 hours.

Dose: 15 gr. (1 Gm.).

Official Preparations: U.S.P. X.

Extract of Cascara Sagrada, 5 gr. (0.3 Gm.).
Fluidextract of Cascara Sagrada, 15 m. (1 cc.).
Aromatic Fluidextract of Cascara Sagrada, 30 m. (2 cc.).

FRANGULA

(frăn′gû-lȧ)

FRANGULA—N.F.

Synonyms: Buckthorn; Alder Buckthorn; Berry Alder; Black Dogwood.

Source: Rhamnus Frangula Linné (Fam. Rhamnaceæ).

Etymology: Frangula from the Lat. "frangere," *to break,* i.e., the wood is quite brittle.

Rhamnus from the Gr. "rhamnos," *buckthorn,* from the Celtic "ram," *a tuft of thorns,* referring to the thorny character of the tree.

Part Used: The dried bark.

Description and Physical Properties: *Unground Frangula:* In quills varying in length, frequently flattened or crushed; from 0.5 to 1 mm. in thickness; outer surface grayish brown or purplish black, with numerous, prominent, lighter-colored, transverse lenticels and occasional patches of foliaceous lichens bearing small, blackish apothecia; inner surface smooth, orange brown to dark brown with occasional purplish blotches, longitudinally striate, becoming red when moistened with solutions of the alkalies; fracture short, slightly fibrous in the inner layer. Odor distinctive; taste slightly bitter.

Habitat: Europe and Northern Africa.

Discussion: This is a shrub growing from 10 to 15 feet in height. The leaves are large, broadly ovate and have entire margins. The flowers are hermaphroditic, two or three appearing together in each axil. The fruit is a purplish berry the size of a pea. Frangula grows in hedges and bushy places throughout Asiatic Russia, except in the far north. Before cascara was introduced in medical practice in 1877, frangula was in great demand as a laxative, but since cascara has proved more active and certain as a cathartic, frangula has gradually become less popular. The fresh bark is nauseating, griping and sometimes emetic, but that which has been seasoned for a year or more loses this property and becomes cathartic, resembling rhubarb and senna, though milder in its action. In the year 1924, 146,759 pounds of frangula were imported.

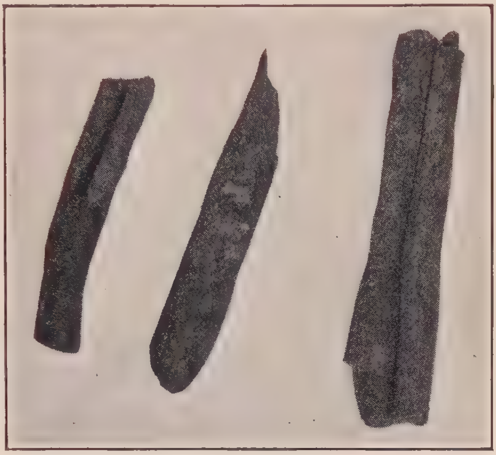


FIG. 62.—Frangula.

CONSTITUENTS: Frangulin, a glucoside which breaks down during the curing process, yielding emodin; resin and tannin.

PROPERTIES AND USES: The properties and uses of frangula are very similar but inferior to those of cascara.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Cathartic Elixir, aperient, 1 fl. dr. (4 cc.).
cathartic, 3 fl. dr. (12 cc.).
Fluidextract of Frangula, 15 m. (1 cc.).

RHAMNUS CATHARTICA

(răm′nŭs kȧ-thär′tĭ-kȧ)

RHAMNUS CATHARTICA—N.F.

SYNONYMS: Buckthorn Berries; Purging Buckthorn.

SOURCE: Rhamnus Cathartica Linné (Fam. Rhamnaceæ).

ETYMOLOGY: Rhamnus from the Gr. "ramnos," a kind of prickly shrub, the buckthorn, from the Celtic "ram," *a tuft of thorns,* referring to the character of the plant.

Cathartica from the Gr. "kathartike," *a purgative,* referring to its medicinal action.

PART USED: The dried, ripe fruit.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Rhamnus Cathartica:* Flattened, globoid or ovoid, from 4 to 8 mm. in diameter; externally purplish black, wrinkled from shrinking of the mesocarp in drying; three- to four-celled, each cell containing a brown, triangular-convex, seed-like nutlet; in the fully dried, ripe fruit the pedicel is usually lacking. Odor faint, unpleasant; taste at first sweetish, then nauseating and bitter; it colors the saliva purplish red. The unripe fruit which is to be rejected, is green to greenish brown, firm, furrowed, pedicel usually attached; very bitter; it colors the saliva greenish yellow.

HABITAT: Europe, Northern Africa. Naturalized in the United States.

DISCUSSION: This is a thorny shrub or small tree growing in thickets and along the borders of woods. The fruits are nearly globular in shape, of a purplish-black color when ripe and measure from 4 to 8 mm. in diameter. Each fruit has from three to four cells or compartments, each containing a seed-like nutlet. The taste is sweetish at first, but soon changes to bitter.

CONSTITUENTS: Emodin; coloring matter; pectin; combined sugars.

PROPERTIES AND USES: This drug, as its name suggests, is cathartic, acting like other emodin-bearing drugs. At present its use is largely confined to veterinary practice.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Fluidextract of Rhamnus Cathartica, 15 m. (1 cc.).
Syrup of Rhamnus Cathartica, 2 fl. dr. (8 cc.).

CHAPTER L

EUPHORBIACEÆ

(ū̇-fôr′bĭ-ā′sē̇-ē)

SPURGE FAMILY

This is a large and important family of herbs, shrubs or trees, numbering about 210 genera and 4000 species. The plants have monœcious or diœcious flowers, 3-seeded capsules and acrid or poisonous, often milky juice.

OLEUM RICINI

(ō′lē̇-ŭm rī-sĭn′ĭ)

CASTOR OIL—U.S.P.

Source: Ricinus communis Linné (Fam. Euphorbiaceæ).

Etymology: Ricinus, the Lat. for *dog tick,* was given because of the shape of the seeds which resemble that of a tick.

Communis, the Lat. for *common* or *general,* i.e., the ordinary or usual species.

Euphorbiaceæ from the Gr. "euphorbos," *well fed,* from "eu," *well,* and "phorbein," *to feed,* referring to the plump shape of the seeds.

Castor from the Lat. "castor," *a beaver,* i.e., alluding to the shape of the seeds.

Part Used: The fixed oil expressed from the seeds.

Description and Physical Properties: A pale, yellowish or almost colorless, transparent, viscid liquid. It has a faint, mild odor, and a bland, afterwards slightly acrid and usually nauseating taste.

Castor Oil is miscible with dehydrated alcohol and with glacial acetic acid.

Habitat: India, Europe, Africa, United States, East and West Indies.

Discussion: In the temperate climates the castor plant is an annual, growing from 3 to 6 or more feet in height, while in the tropics it is a perennial tree, growing 40 or 50 feet in height and from 12 to 15 inches in diameter, with a woody trunk. The large peltate, palmately-divided leaves are arranged alternately upon the stem which, in this country, is erect, smooth and hollow, branching near the top with the upper portion somewhat purplish in color.

The flowers occur in pyramidal, terminal racemes of which the lower portion is occupied by the staminate flowers and the upper portion by the pistillate. The fruit is a trilocular capsule, thickly beset with short, sharp spines and containing one seed in each cell. These are about the size of ordinary white beans, very smooth and of a grayish color mottled with reddish-brown spots.

The kernel of the seed contains about 50 per cent of a heavy fixed oil which is obtained by expression. It also contains an extremely poisonous principle called "*ricin*" which is a toxalbumin. It has been calculated that a fatal dose for a man would be about 1/20 gr. In order to remove albumin, the oil is steamed for the purpose of coagulating it, after which it is removed by straining. Three of the fresh seeds have been known to produce a fatal gastro-enteritis. 293,471 pounds of castor oil were imported during 1924.

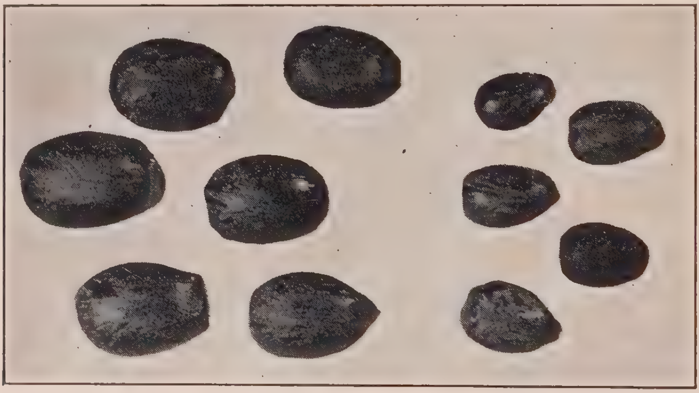


FIG. 63.—Castor seeds or "beans."

CONSTITUENTS: Castor oil consists principally of ricinolein, an unsaturated, fatty acid which has the chemical formula $C_3H_5(C_{18}H_{33}O_3)_3$. There is also some palmitin, stearin and myristin.

PROPERTIES AND USES: The purgative action of castor oil is well-known and is due to the breaking up of the molecule under the combined action of the digestive juices, with the liberation of ricinoleic acid, which mildly irritates the bowel causing purgation in from four to six hours. The stools are quite liquid and the action is followed by a soothing effect on the intestines. Thus castor oil is used as a purgative in a number of conditions such as diarrhea, dysentery and enteritis, the object being to empty the bowel, thus getting rid of the cause of the irritation, and securing the sedative after-effect. It is used as a purgative for simple constipation, especially in children, and in the constipation of pregnancy where its gentle action is of considerable advantage. Castor oil is a powerful adjuvant to many anthelmintic drugs, supplementing the action of the vermicide, but must not be given in connection with aspidium since it promotes the absorption of the otherwise non-absorbable filicic acid which then acts on the host with poisonous effect. Castor oil is used in the manufacture of soaps and as a lubricant for internal combustion engines. Enormous quantities were used during the world war in airplane motors.

DOSE: 4 fl. dr. (15 cc.).

OFFICIAL PREPARATION: U.S.P. X.
Flexible Collodion.

OLEUM TIGLII
(ō′lĕ-ŭm tĭg′lĭ-ī)

CROTON OIL—U.S.P.

SYNONYM: Purging Croton.

SOURCE: Croton Tiglium Linné (Fam. Euphorbiaceæ).

ETYMOLOGY: Croton from the Gr. "kroton," *a dog tick*, so named because of the resemblance of the seeds to that insect.

Tiglium from the Gr. "tilos," *diarrhea*, from "tilao," *to have a thin stool*, referring to the purgative action.

PART USED: The fixed oil expressed from the seeds.

DESCRIPTION AND PHYSICAL PROPERTIES: A pale yellow or brownish yellow, somewhat viscid and slightly fluorescent liquid, having a slight, characteristic odor.

Croton Oil is slightly soluble in alcohol, the solubility increasing with age; freely soluble in ether, chloroform, and in fixed or volatile oils.

Caution: Croton Oil must be handled with caution as it causes pustular eruptions when applied to the skin.

HABITAT: East Indies, Philippine Islands, Borneo, Japan, Hindustan.

DISCUSSION: This species of croton is a shrub or small tree with opposite, petiolate, dark-green leaves. The flowers occur in erect, terminal racemes, both staminate and pistillate flowers being present. The fruit is a smooth trilocular capsule about the size of a cherry and contains three seeds about the size of coffee beans.

The oil is obtained by expression after the seeds have been deprived of their shells, the yield being about 20 to 40 per cent of the weight of the seeds (about 50 per cent from the kernels alone). The oil is of a pale- or brownish-yellow color, somewhat viscid and slightly fluorescent. It has a fatty odor, acrid taste and is slightly acid in reaction. In 1924, 17,093 pounds of this oil were imported.

CONSTITUENTS: The fixed oil consists principally of the glycerides of stearic, palmitic, oleic, myristic and lauric acids. Tiglic acid ($HC_4H_7CO_2$), isomeric with angelic acid, crotonol or crotonoleic acid. Croton resin has also been reported present.

PROPERTIES AND USES: Croton oil is a drastic hydragogue purgative, producing copius watery stools in from 30 minutes to an hour after taking. Overdoses cause purging, vomiting and a severe congestion of the intestinal tract, and sometimes death from gastro-enteritis. It is rarely used except in extreme cases where time or very powerful action is an important element. Thus it is used in apoplexy or paralysis for its prompt action for the purpose of lowering the general blood pressure. It is sometimes used as an adjuvant with vermifuge remedies to dislodge persistent tapeworms. It is also used for its purgative action in lead colic, fecal impaction and obstinate constipation.

Externally croton oil is very irritant, producing vesication or even pustulation, and is employed, either by itself or in the form of a liniment for glandular swellings, bronchitis, pleurisy, ovaritis, etc.

DOSE: 1 m. (0.06 cc.).

ELASTICA

(ē-lăs′tĭ-kȧ)

RUBBER—U.S.P. VIII

SYNONYMS: India Rubber; Para Rubber; Caoutchouc.

SOURCE: Several species of Hevea Aublet (Fam. Euphorbiaceæ).

ETYMOLOGY: Elastica from the Lat. "elasticus," *elastic*, referring to the property of returning to its original shape after being distorted.

Caoutchouc from "cahuchu," the native (Brazilian) Indian name for the coagulated milk juice.

Hevea from "Heve," the native (Brazilian) Indian name for the tree producing rubber.

PART USED: The prepared milk juice known in commerce as "*Para Rubber.*"

DESCRIPTION AND PHYSICAL PROPERTIES: In flask-shaped or roundish masses, or in pieces of the same having sharply incised surfaces and exhibiting a laminated structure; floating on water; externally brownish to brownish black; internally of a lighter tint, mottled; odor creosote-like; nearly tasteless.

Pure Para Rubber is insoluble in water, dilute acids, or dilute solutions of the alkalies; soluble in chloroform, carbon disulphide, oil of turpentine, petroleum benzin, and benzene; when heated to about 125° C. (257° F.) it melts, remaining soft and adhesive after cooling.

HABITAT: South America, especially Guiana and Brazil. Now cultivated in India, Ceylon and many other parts of the Orient; also in the West Indies, Africa and Mauritius.

DISCUSSION: Although the official source of rubber is limited to the genus Hevea, it has been claimed that rubber for commercial purposes is obtained from numerous other species of plants representing several different botanical families. It is asserted, however, on apparently good authority that the best quality of Para rubber all comes from one tree, the "*Hevea braziliensis*" which grows abundantly in the Amazon River valley. It was from there that the seeds were obtained to start the great plantations of the Far East. They are claimed to have been carried over by a Mr. Wickham as early as 1876. It seems that Mr. Wickham was employed by the Indian Government to supply the seeds, but that the Brazilian authorities opposed the exportation for purely commercial reasons. His opportunity came, however, when a steamer, without return freight, was discovered in the Amazon. This he promptly chartered and some 70,000 seeds were shipped out, along with other things, listed as "*botanical specimens.*" These were planted in the famous Kew gardens, which later supplied Burma, Java, the West Indies and Singapore. It is stated that from 300 acres in Ceylon in 1890 the industry had grown to more than 245,000 acres by 1910. The British colonies now supply a large percentage of all the rubber produced. The 1923 estimated figures of rubber consumption by countries showed the entire output for the year to have been over 400,000 tons of which the United States used approximately three-fourths.

Rubber is a hydrocarbon made from the milk juice of the aforenamed trees. The juice is contained in the so-called "*laticiferous*" vessels located in the bark and is obtained by making incisions in the bark with a narrow-bladed hatchet and collecting the juice in cups as it exudes. The period of this collection in Brazil lasts from about the first of September to the first of January.

The manufacture of rubber is not entirely a modern industry, as is generally supposed, for after the second voyage of Columbus to the "New World" in 1493, his men reported having seen the natives of Haiti playing games with elastic balls which were thrown, caught, bounced, etc., much the same as today. Also in an account of the "New World," published by Torquemada, reference is made to the custom of the natives of smearing the juice of trees over their nude bodies, then scraping it off after it had coagulated, when it was worked into vessels of various forms and used for carrying water. In 1842 the property of rubber to unite with sulphur (vulcanizing) was discovered. In this form it is not affected by ordinary solvents or temperatures, thus extending the field of its usefulness considerably.

Much progress has been made in recent years in the chemistry of rubber. The method of preparation at the place of collection, however, although differing considerably in different countries, remains essentially the same in some of them. The following account, taken practically verbatim from a report to the State Department by a former United States Consul at Para, Brazil, gives a very clear idea of the preparation of rubber in that country, and although written many years ago, is basically as true today as it was at that time. He says "the localities where rubber trees thrive best is on the islands and low ground near rivers where the banks are periodically inundated. Ground that is above water at all times, or that which has no drainage is not suitable. The peculiarity of this rubber tree (now called Hevea braziliensis) is that it will not grow well on cleared or open ground. It requires the shade of other trees and still air from the time its growth begins until it becomes an adult tree. Without these conditions the supply of milk is much affected. In fact the trees have been known to die soon after the removal of other trees about them. No cultivation worthy of mention has been attempted in the region of the Amazon although extensive plantations are under cultivation elsewhere. The Hevea require about 15 years to mature.

"The area that is known to produce Para rubber amounts to at least 1,500,000 square miles. Further exploration will doubtless show that this area is far under-estimated. On the River Aquiry, or Acre, one of the tributaries of the River Purus, 200 trees will yield as much as three tons of rubber per annum. Great quantities of Hevea are known to exist on the banks of the Yapura, but the district has not yet been opened up."

Among the articles used in the making of rubber by the native Brazilian, is a clay funnel, in shape very much like an ordinary water jug, but without a bottom or handle. It is made of the clay found in that region. This funnel is placed above a small fire, made by burning the nuts of several native palms, in such a way as to cause the smoke to be emitted through the neck of the funnel. It was thought at one time that the excellence of Para rubber was largely due to the kind of fuel used in curing it. Specimens of these palms were accordingly transplanted in Africa to be used in connection with the rubber industry there, but the experiment met with limited success. The reason these nuts are used in Brazil is because they emit a continuous, dense smoke and are more portable than other fuels obtainable. Accessible bark and twigs are also employed.

In the Amazon region each rubber collector carries a knife resembling the Cuban machette. It has a blade about 26 inches in length by 2 in breadth. He also carries a small ax which is used principally for smoothing off the bark preparatory to attaching the cups to the trees. The cups used are made of clay or tin. Those made of clay may be attached to the tree by means of a little dab of plastic clay. The tin cups are attached by forcing the edge into the bark. Another utensil of the collector's outfit consists of a large gourd which will hold the contents of from 500 to 700 cups. This he uses in making the collection of milk juice. He also has a large clay bowl that will hold the product of several days' gathering. These, together with a wooden paddle on which the juice is coagulated, constitute the rubber gatherer's outfit.

The machette-like knife is used by the collector to cut his way through the underbrush or to cut poles for bridging the streams. On arriving at a tree he cuts away the rough portion of the bark, makes the incision and attaches the cup in such a way that the juice will flow in. This operation is continued about the tree until a number of incisions are made. Some tap the trees in the morning and gather the milk juice in the evening, while others tap the trees in the evening and collect in the morning. One man can gather from 10 to 20 pounds of juice per day.

When the accumulation of juice is sufficient, usually from 3 to 5 days' gathering, the collector builds a fire and places his funnel over it in such a way as to emit a small stream of smoke from the neck of the funnel. He then dips the paddle into the milk juice and constantly rotates it in the smoke while it coagulates. This alternate dipping and rotating in the smoke is repeated until a mass of rubber the size of a smoked ham has been formed. In order to release the paddle, it is necessary to slit the cake down one side.

Many attempts have been made to introduce improved methods for the curing of rubber, but up to date they have met with scant favor among the rubber collectors of the Brazilian plantations. The method just described, although very primitive, possesses the advantage of being both simple and inexpensive, and produces an excellent quality of rubber. It is, however, injurious to the eyes on account of the smoke and numerous cases of blindness have resulted therefrom.

The newer method of rubber preparation on the great plantations is a great improvement over the older one just detailed. The rubber, which constitutes about one-third of the latex, is precipitated or coagulated by the addition of acid. The resulting white, dough-like coagulum is passed between hot rollers to remove adhering water. At this stage the crude rubber is in irregular sheets about ¼ inch thick and 18 inches square. These are hung up for a time and then shipped to rubber manufacturing centers, mostly to the tire makers.

Quite recently another process of using rubber has developed which requires pure latex for dipping or spraying the cords and fabric used in tire manufacture. The method of preparing this liquid seems to consist in filtering the latex as collected and adding a preservative. It is shipped in large storage tanks.

Combined with about 10 per cent of sulphur, or better still, with antimony sulphide, rubber is used in making various articles such as rubber tubing, syringes, hot-water bottles, etc., etc. With 50 per cent of sulphur it makes "*hard rubber*" such as is used in the manufacture of combs, syringes, etc. This process is known as "*vulcanizing*." Rubber is insoluble in dilute acids or alkalies, but is more or less soluble in chloroform, carbon disulphide, oil of turpentine, benzin and benzol. Combinations of these solvents are ordinarily employed in making rubber cements. The importation of crude rubber for the year 1924 amounted to 734,845,218 pounds.

KAMALA

(kä-mȧ′lȧ)

KAMALA—U.S.P. VII

Synonyms: Rottlera; Spoonwood.

Source: Mallotus Philippinensis (Lamarck), Mueller Arg (Fam. Euphorbiaceæ).

Etymology: Kamala is the native Bengalese name of the drug.

Mallotus from the Gr. "mallotos," *fleecy*, in reference, no doubt, to some characteristic of the plant.

Philippinensis refers, of course, to the habitat.

Rottlera from "Rottlera tinctoria," another botanical classification of the plant.

Part Used: The glands and hairs separated from the capsules.

Description and Physical Properties: A granular, mobile, brick-red powder, inodorous and nearly tasteless, imparting a deep-red color to alkaline liquids, alcohol, ether, or chloroform. Under the microscope it is seen to consist of stellately arranged, colorless hairs, mixed with depressed-globular glands, containing numerous red, club-shaped vesicles.

When heated in a crucible to redness, it should leave not more than 8 per cent of ash.

HABITAT: Philippine Islands, Australia, India, China.

DISCUSSION: The plant yielding kamala is a small tree growing from 15 to 20 feet in height. The fruit is a round, trilocular capsule about the size of a small cherry and is covered with reddish glands which constitute the commercial drug. These glands are removed by shaking the fruits in baskets whereupon they become detached and fall through the meshes.

They occur as a mobile, brick-red powder, inodorous and nearly tasteless. Under the microscope the drug is seen to consist of stellately arranged hairs mixed with globular-shaped glands which contain numerous, red, club-shaped vesicles.

CONSTITUENTS: Resin; volatile oil.

PROPERTIES AND USES: Kamala is an efficient anthelmintic. As it has laxative properties, it can be used alone. It may be administered suspended in mucilage (as of acacia), syrup or merely water, and the dose should be repeated if necessary in about 3 or 4 hours. Kamala has been employed in the form of an ointment for scabies and ringworm, but is probably not so efficacious as other remedies for this purpose.

DOSE: ½ to 2 dr. (2-8 Gm.).

STILLINGIA

(stĭ-lĭn′jĭ-ȧ)

STILLINGIA—N.F.

SYNONYMS: Queen's Root; Queen's Delight; Silver Leaf; Yaw Root; Nettle Potato.

SOURCE: Stillingia sylvatica Linné (Fam. Euphorbiaceæ).

ETYMOLOGY: Stillingia was named for Benjamin Stillingfleet, an English botanist of the eighteenth century.

Sylvatica from the Lat. "silva," *woods* or *forest,* from the fact that it grows in woody localities.

PART USED: The dried root.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Stillingia:* When entire, terete, unequally tapering, rarely branched, usually in pieces, sometimes attaining a length of 40 cm. and from 0.5 to 3 cm. in diameter, externally reddish brown, longitudinally wrinkled; fracture very fibrous; internally the bark is light reddish brown, thick, spongy, finely fibrous, with numerous resin cells and easily separable from the porous, radiate wood; odor distinct; taste bitter, acrid and pungent.

HABITAT: Southern United States.

DISCUSSION: Stillingia is an herbaceous perennial plant growing in the sandy soil of the pine barrens from Maryland to Florida and westward as far as Kansas and Texas. The stems are from 2 to 3 feet in height with alternate, sessile leaves. It flowers in May and June. The flowers are yellow and are arranged in the form of a spike, the upper portion being occupied by the staminate and the lower by the pistillate flowers. The root is large and woody. The plant contains a milky juice.

CONSTITUENTS: Volatile oil, 3 or 4 per cent to which the odor, pungency and acrid taste are due; an alkaloid, stillingine.

PROPERTIES AND USES: Stillingia is a simple bitter, laxative and alterative. It is used in chronic constipation and in hemorrhoids resulting in large part from hepatic engorgement. It is often given in combination with sarsaparilla and other alteratives.

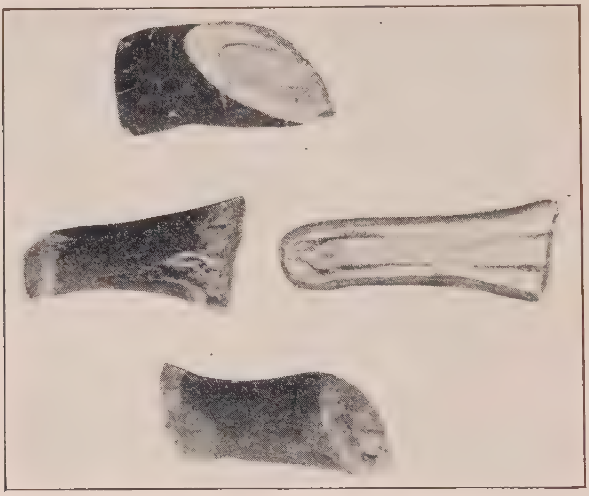


FIG. 64.—Stillingia. $\frac{2}{3}$ natural size.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Elixir of Corydalis, 1 fl. dr. (4 cc.).
Fluidextract of Stillingia, 30 m. (2 cc.).
Compound Fluidextract of Stillingia, 30 m. (2 cc.).
Compound Syrup of Stillingia, 1 fl. dr. (4 cc.).

EUPHORBIA

(ŭ-fôr′bĭ-ȧ)

EUPHORBIA—N.F.

Synonyms: Euphorbia pilulifera; Pill bearing Spurge.
Source: Euphorbia hirta Linné (Fam. Euphorbiaceæ).
Etymology: Euphorbia, the Lat. name of the plant, given in honor of Euphorbus, a Greek physician.

Pilulifera from the Lat. "pilula," *a pill*, from "pila," *a ball*, and "ferre," *to bear*, referring to the flower-heads.

Part Used: The dried herb.

Description and Physical Properties: *Unground Euphorbia:* Roots usually present, small, branched and reddish; stems slender, cylindrical, obliquely erect, dichotomously branched from near the base, branches recurved at apices; branches and stem only sparsely leafed at base, pale greenish brown, rough or hairy, rather densely on the upper parts but sparsely on the lower; leaves opposite, obliquely oblong, acute, serrulate, rusty pale green, pubescent especially on the prominent veins on the lower surface, becoming brittle on drying and usually much broken in the drug; flowers small, numerous, in short peduncled axillary clusters; fruits about 2 mm. in diameter, three-celled capsules; seeds about 0.9 mm. in diameter, triangular ovoid, pale brown. Odor aromatic and characteristic, taste faintly bitter, aromatic and acrid.

Habitat: Arizona, New Mexico, Southern Texas.

Discussion: This is an annual herbaceous plant found growing in most tropical and sub-tropical countries. It presents a purplish-green or reddish-purple color and is more or less pubescent throughout. The leaves are about ½ inch in length, have serrate edges and stand on short petioles. The flowers are monœcious and occur in small, globular heads.

Constituents: Resin; alkaloid; glucoside.

Properties and Uses: Euphorbia is a stimulant and has been used empirically with asserted success in asthma, chronic bronchitis and inflammation of the respiratory mucous membrane.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Fluidextract of Euphorbia, 30 m. (2 cc.).
Compound Elixir of Euphorbia, 1 fl. dr. (4 cc.).

CHAPTER LI

PEDALIACEÆ
(pė-dā′lĭ-ā′sė-ē)

PEDALIACEÆ

THIS is a family of annual, or perennial, hairy, tropical herbs with opposite leaves and often with handsome flowers having bilabiate corollas. The family contains 14 genera and about 50 species.

OLEUM SESAMI
(ō′lė-ŭm sĕs′ȧ-mĭ)

SESAME OIL—N.F.

SYNONYMS: Teel Oil; Benne Oil.

SOURCE: One or more cultivated varieties of Sesamum indicum Linné (Fam. Pedaliaceæ).

ETYMOLOGY: Sesame from the Gr. "sesamon," the original name of the plant.

Indicus from the Gr. "Indikos," of or pertaining to India.

Pedaliaceæ from the Gr. "pedalion," *a rudder,* from "pedos," *an oar,* alluding to the keeled angles of the fruit.

PART USED: A fixed oil obtained from the seeds.

DESCRIPTION AND PHYSICAL PROPERTIES: Sesame Oil is a pale yellow, oily liquid, almost odorless, and having a bland taste.

It is slightly soluble in alcohol, miscible with ether, chloroform, petroleum benzin, or carbon disulphide.

HABITAT: Africa, Formosa, Java, India. Cultivated in the United States and West Indies.

DISCUSSION: This is an inodorous, bland fixed oil obtained by expression from the ripe seeds. It resembles olive oil somewhat and is used for about the same variety of purposes. The plant has long been in cultivation by the Arabians, Persians and Egyptians and is supposed to have reached the United States during the African slave trade. The seeds are used in its native countries as a food, being made into a sort of bread, pudding, or roasted and made into a soup.

Constituents: The seeds contain about 22 per cent of proteins in addition to from 45 to 55 per cent of the fixed oil and 4 per cent of mucilage. The oil consists of the glycerides of oleic, palmitic, stearic, linoleic and myristic acids, the olein constituting about 75 per cent.

Properties and Uses: Like olive oil, sesame oil is nutrient, laxative, demulcent and emollient. It is used internally in the form of emulsions and in the manufacture of many cosmetics.

Official Preparations: N.F. V.

Ammonia Liniment.
Infused Oils.

CHAPTER LII

UMBELLIFERÆ

(ŭm′bĕ-lĭf′ĕr-ē)

CARROT FAMILY

The plants of this family are herbs, usually with hollow stems and alternate, compound or de-compound leaves. The flowers are small, occurring in simple or compound umbels. The fruit is a cremocarp, consisting of two coherent achenes called "*mericarps.*" These separate at the commisural plane. These fruits are commonly called "*seeds.*" The family numbers about 1600 species which are widely distributed, being most abundant in the temperate zones.

(*a*) CARUM

(kā′rŭm)

CARAWAY—U.S.P.

(*b*) OLEUM CARI

(ō′lē-ŭm cā′rī)

OIL OF CARAWAY—U.S.P.

Synonyms: (*a*) Caraway Fruit, Caraway Seed.
(*b*) Caraway Oil.

Source: Carum Carvi Linné (Fam. Umbelliferæ).

Etymology: Carum from the Lat. "careum," from the Gr. "karon," from "Caria," an ancient division of southwestern Asia Minor which was the original home of the plant.

Carvi is the Lat. for "carvy" or "carvey," the Scotch name for caraway. "Carui" was the name used by medieval pharmacists for the drug.

Caraway from "karawya," the Arabic name of the plant.

Umbelliferæ from the Lat. "umbella," *a little shadow,* and "ferre," *to bear,* i.e., umbel-bearing. (Umbrella is a dim. of "umbra," *shade.*)

PART USED: (*a*) The dried, ripe fruit.

(*b*) The volatile oil distilled from the dried, ripe fruit and containing not less than 50 per cent by volume of carvone ($C_{10}H_{14}O$.)

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) *Unground Caraway:* Usually in separated mericarps; curved, tapering towards both ends; up to 7 mm. in length and 2 mm. in diameter; externally dark brown with five yellow filiform ribs; odor and taste aromatic.

(*b*) A colorless or pale yellow liquid, having the characteristic odor and taste of caraway.

HABITAT: Europe, Central and Western Asia, Himalayas, Caucasus Siberia, United States.

DISCUSSION: This is an umbelliferous, biennial plant growing 2 or more feet in height and has a spindle-shaped, fleshy root. It is much branched and has doubly-pinnate, deeply-incised leaves the segments of which are linear and pointed. The flowers which are small and white occur in erect umbels at the extremities of the stems. They appear in May or June, but the fruits do not ripen until August of the following year. The root, improved by cultivation, resembles the parsnip.

The drug consists of the separated mericarps (the two mericarps, con-joined, constitute the cremocarp) which are about one-fourth inch in length, curved and tapering at the ends. They are distinctly ribbed, each mericarp containing six oil tubes running its entire length and visible in cross-section under the microscope. Two of the oil tubes are on the commissural surface and four on the back of the mericarp. During the year 1925, 4,829,449 pounds of caraway were imported.

CONSTITUENTS: Volatile oil, 3 to 7 per cent; fixed oil; resin; tannin; sugar. The volatile oil is obtained by steam distillation and is a colorless or pale yellow, dextrorotatory liquid of characteristic odor and taste. It is required to assay not less than 50 per cent by volume of carvone ($C_{10}H_{14}O$). It contains about the same amount of *d*-limonene.

PROPERTIES AND USES: Caraway fruit is stomachic and is used as a flavoring or spice in bread, cakes and other articles of food. On account of the volatile oil present it is a good carminative and is largely employed in flatulence and colic, especially for children. The stimulant and carminative action combine to make it a good corrigent for administration with purgative drugs to prevent griping.

DOSE: (*a*) The fruit: 15 gr. (1 Gm.).

(*b*) The oil: $1\frac{1}{2}$ m. (0.1 cc.).

OFFICIAL PREPARATION: U.S.P. X.

Compound Tincture of Cardamom (seeds), 1 fl. dr. (4 cc.)

(*a*) ANISUM

(ȧ-nī′sŭm)

ANISE—N.F.

(*b*) OLEUM ANISI

(ō′lē̆-ŭm ȧ-nī′sī)

OIL OF ANISE—U.S.P.

Synonyms: (*a*) Anise Fruit: Anise Seed; Aniseed.
(*b*) Anise Oil.

Source: (*a*) The Fruit: Pimpinella Anisum Linné (Fam. Umbelliferæ).
(*b*) The Oil: Pimpinella Anisum Linné (Fam. Umbelliferæ) or Illicium verum Hooker filius (Fam. Magnoliaceæ).

Etymology: Pimpinella from the Lat. "bipinnella," *twice-winged,* i.e., doubly-pinnate leaves, from "bis," *twice,* and "penna," *a feather* or *wing.*

Anisum from the Gr. "anison," from the Arabic "anisum," the classical name of anise.

Illicium from the Lat. "illicium," *an allurement*, referring to its attractive aroma.

Verum from the Lat. "verus," *true,* i.e., the true star-anise in contradistinction to Illicium religiosum, Sieb et Zuci, the Japanese star-anise which are known as "*Shikimmi fruits*"; the latter being extensively cultivated in the gardens of the Buddhist Temples in Japan.

Part Used: (*a*) The dried, ripe fruit.
(*b*) The volatile oil distilled from the dried, ripe fruit.

Description and Physical Properties: (*a*) *Unground Anise:* Cremocarps broadly oval, laterally compressed, 3 to 6 mm. long and 2 to 3 mm. wide; mericarps usually cohering and attached to a slender pedicel 2 to 12 mm. long; apex with a ring-like disk and 2 projecting, diverging styles; externally grayish or greenish gray, seldom grayish brown, slightly pubescent; each mericarp with 5 light brown filiform ridges. Odor and taste agreeable and aromatic.

(*b*) A colorless or pale yellow, strongly refractive liquid, having the characteristic odor and taste of anise.

Habitat: Anise (Pimpinella Anisum) grows in Western Asia, Egypt, Southeastern Europe. Cultivated in all temperate climates.

Star-anise grows in Northern Annam and Southwestern China. Widely cultivated.

Discussion: Pimpinella Anisum is an annual plant, a foot or more in height and having an erect, branching stem. The flowers are white and are disposed in compound umbels at the ends of the stems. The fruit is about one-fourth of an inch in length and consists of two mericarps. Each mericarp has about 15 oil tubes and is covered with fine grayish hairs. The fruits of the poison hemlock resemble those of the anise, but contain no oil tubes, have no seed hairs and almost no odor.

Anise has been in use as an aromatic from very remote times. Mention was made of it by Theophrastus. It was cultivated on the imperial farms of Charlemagne. In 1305 Edward I granted a patent giving the right to levy tolls upon anise at the Bridge of London for the purpose of repairing the bridge. The importation of anise during the year 1924 amounted to 433,917 pounds. During the same period, 134,160 pounds of the oil of anise were brought in.

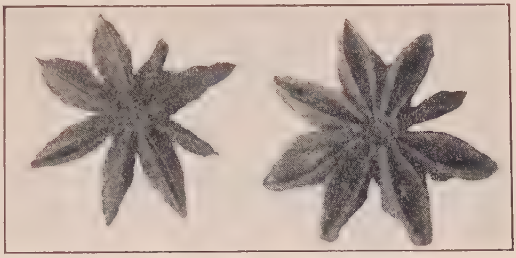


Fig. 65.—Star Anise fruit.

Illicium verum is a small tree growing from 10 to 20 feet in height. Its fruit was official in the 1890 pharmacopœia under the title "*Illicium.*" The fruit consists of eight boat-shaped carpels arranged around a central axis. Each carpel has an acute summit tapering to a nearly straight beak. The carpel is reddish brown and somewhat wrinkled externally, while the inner surface is smooth and shiny and encloses a single seed. The odor and taste of the carpel resemble the anise, the oils being practically identical. The pharmacopœia requires, however, that the label state from which source it is obtained. In 1925, 621,154 pounds of anise were imported.

Constituents: (*a*) The Fruit: Volatile oil, 1 to 3 per cent; fixed oil; choline; resin. When chilled the volatile oil separates into a solid crystalline mass constituting about 90 per cent of its weight, and leaving the remainder in the form of a liquid. This crystalline portion is called "*anethol*" and is the fragrant part of the oil. The Pharmacopœia directs, in case solid material (anethol) has separated out, to carefully warm the oil until completely liquefied and mix thoroughly before dispensing.

(*b*) The volatile oil consists chiefly of anethol ($C_{10}H_{12}O$) which gives the oil its characteristic odor.

Properties and Uses: Anise is carminative and is used for flatulence and colic, especially in children. Ordinarily it is employed in the form of the volatile oil which may be administered on a little sugar. Its stimulant and stomachic properties render it useful as a corrigent to cathartic remedies to prevent griping, but it is probably not so good as fennel in this respect. The oil is largely employed as a flavoring agent for foods and confections. It is used as an aromatic in veterinary remedies since animals are not adverse to its odor.

Dose: (*a*) The fruit: 8 gr. (0.5 Gm.).
(*b*) The oil: $1\frac{1}{2}$ m. (0.1 cc.).

Official Preparations:
(*a*) N.F. V.
Sweet Tincture of Rhubarb, 30 m. (2 cc.).
Laxative Species, 20 gr. (1.3 Gm.).
Pectoral Species, 1 dr. (4 Gm.).
(*b*) U.S.P. X.
Anise water, 4 fl. dr. (15 cc.).
Spirit of Anise, 15 m. (1 cc.).
Compound Spirit of Orange.
Camphorated Tincture of Orange, 1 fl. dr. (4 cc.).

(*a*) FŒNICULUM

(fĕ-nĭc′ū-lŭm)

FENNEL—N.F.

(*b*) OLEUM FŒNICULI

(ō′-lē̆-ŭm fĕ-nĭc′-ū-lī)

OIL OF FENNEL—U.S.P.

Source: (*a*) Cultivated varieties of Fœniculum vulgare Miller (Fam. Umbelliferæ).
(*b*) Fœniculum vulgare Miller (Fam. Umbelliferæ).

Etymology: Fœniculum from the Latin fœnum, *hay*, because of a similarity of odor.
Vulgare, the Lat. for common.

Part Used: (*a*) The dried, ripe fruit.
(*b*) The volatile oil distilled from the dried, ripe fruit.

Description and Physical Properties: (*a*) *Unground Fennel:* Mericarps usually separate, each being broadly elliptical with the commissural surface flattened; more or less curved, from 4 to 15 mm. in length and from 1 to 3.5 mm. in breadth, some having a slender stalk from 2 to 10 mm. in length; dorsal surface convex, yellowish green to grayish brown, with five prominent longitudinal primary ribs and at the summit a short, conical stylopodium; commissural surface with three narrow, light brown longitudinal areas separated by two dark brown or brownish-black areas containing oil tubes. Odor and taste aromatic and characteristic.

(*b*) *Oil of Fennel:* A colorless or pale yellow liquid, having the characteristic odor and taste of fennel.

HABITAT: Southern Europe and Asia. Cultivated in Europe and the United States.

DISCUSSION: The aromatic herb yielding fennel may be either biennial or perennial. It attains a height of from 3 to 5 feet and has compound leaves and large umbels of small, yellow flowers. The fruit is a cremocarp the outer layer of which contains generally six oil tubes. There are several commercial varieties of fennel designated as German, French, Hungarian, Italian and Levant. The German is generally preferred. It is larger than the others and is of a greenish-gray color.

CONSTITUENTS: (*a*) The Fruit: Fennel contains from 3 to 6 per cent of volatile oil.

(*b*) The oil contains anethol, $C_{10}H_{12}O$, to the extent of 50 to 60 per cent. This crystallizes out upon cooling down to a temperature of about 0° C. The liquid portion consists of a mixture of *d*-fenchone, $C_{10}H_{16}O$; a terpene, $C_{10}H_{16}$; anisic acid and aldehyde and limonene. The composition is not constant, as it varies with the source of the fruit.

PROPERTIES AND USES: These may be grouped together for the fruit and its oil. They are both agreeably aromatic and are used to impart a pleasant flavor and aroma to pharmaceutical products. Both are carminative.

DOSE: (*a*) The fruit: 15 gr. (1 Gm.).
(*b*) The oil: 1½ m. (0.1 cc.).

OFFICIAL PREPARATIONS: N.F. V.
(*a*) The fruit:
Compound Infusion of Senna, 4 fl. oz. (120 cc.).
U.S.P. X.
(*b*) The oil:
Fennel Water, 4 fl. dr. (15 cc.).
Compound Licorice Powder, 1 dr. (4 Gm.).

CONIUM

(kō̇-nī′ŭm)

CONIUM—N.F.

SYNONYMS: Poison Hemlock; Spotted Hemlock; Hemlock Fruit; Poison Parsley; Spotted Cowbane.

SOURCE: Conium maculatum Linné (Fam. Umbelliferæ).

Etymology: Conium from the Gr. "koneion," from "konesthæ," *to whirl around, to become dizzy,* from "konos," *a top,* referring to the physiological action of the drug.

Maculatum the Lat. for *spotted,* from "macula," *a spot,* referring to the brownish-purple spots on the stem.

Part Used: The dried, full-grown, but unripe fruit which is required to contain not less than 0.5 per cent of coniine.

Description and Physical Properties: *Unground Conium:* Broadly oval, greenish gray, the two mericarps often separated, each about 3 mm. long and about 1.5 mm. in diameter, ovoid, somewhat curved; the inner flattened side marked by a deep, longitudinal groove; the outer convex side with five, pale yellow, somewhat crenate ribs; the intervening surfaces wrinkled; pericarp without oil-tubes. Odor slight, but when triturated with a solution of potassium hydroxide T. S., strong, disagreeable and mouse-like; taste characteristic, disagreeable, afterwards somewhat acrid.

Habitat: Europe and Asia. Cultivated in America.

Discussion: Conium is a biennial with a smooth, hollow, herbaceous stem growing from 3 to 6 feet in height. The stem is slightly striated and marked with brownish-purple spots. The lower leaves are tripinnate, 12 or more inches in length and attached to the joints of the stems by sheathing petioles. The upper leaves are smaller in size, bipinnate and inserted at the divisions of the branches. The flowers, which are very small and white, are disposed in compound terminal umbels.

The fruit is a cremocarp, often separated into the two mericarps, each of which has five ribs but no oil tubes. Hemlock has only a slight odor or taste, but when triturated with an alkaline solution, a strong, disagreeable, mouse-like odor is evolved. This is due to the liberation of the volatile, poisonous alkaloid, coniine. The plant varies in its narcotic powers according to the weather and climate, being more active in hot and dry seasons and in warm climates. The hemlock from the south of Europe is thus more active than that grown farther north.

It is believed that conium was the state poison employed by the Athenians for the execution of criminals. It is certain that the progressive symptoms as experienced and described by Socrates, on the occasion of his death by poison, coincided in every respect with the symptoms produced by this drug.

Constituents: Coniine, $C_8H_{17}N$, 0.2 to 0.9 per cent, an oily, liquid, volatile alkaloid resembling nicotine; methyl coniine, $C_8H_{16}(CH_3)N$; conhydrine, $C_8H_{17}NO$, a solid but volatile alkaloid.

Properties and Uses: Conium was used as an antispasmodic to control the spasms of a number of conditions such as whooping-cough, tetanus, asthma, epilepsy, spasmodic chorea and the cough of bronchitis and pleurisy. It was also used as a soporific and anodyne. Coniine causes paralysis of the motor nerves, sensation and consciousness remaining unimpaired till practically the end. The effect begins at the extremities and progresses toward the centers, thus paralyzing the peripheral endings of the motor nerves first, then the nerve trunks and finally the centers. Its use in medicine is practically obsolete.

DOSE: 3 gr. (0.2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Extract of Conium, ½ gr. (0.03 Gm.).

(a) CORIANDRUM

(kō′rĭ-ăn′drŭm)

CORIANDER—N.F.

(b) OLEUM CORIANDRI

(ō′lē-ŭm kō′rĭ-ăn′drī)

OIL OF CORIANDER—U.S.P.

SYNONYMS: (a) Coriander Fruit; Coriander Seed.
(b) Coriander Oil.

SOURCE: Coriandrum sativum Linné (Fam. Umbelliferæ).

ETYMOLOGY: Coriandrum from the Gr. "koris," *a bedbug,* and "aneson," *anise,* because its odor was thought to resemble that of the bedbug when green and that of anise when ripe.

Sativum from the Lat. "sativus," *sown* or *cultivated.*

PART USED: (a) The dried, ripe fruit.
(b) The volatile oil distilled from the dried, ripe fruit.

DESCRIPTION AND PHYSICAL PROPERTIES: (a) *Unground Coriander:* Mericarps usually coherent; cremocarp nearly globular, from 2 to 5 mm. in diameter; externally light brown or rose-colored; apex with 5 calyx teeth and a short stylopodium, each mericarp with 5 prominent, straight, longitudinal primary ribs and 4 indistinct, undulate secondary ribs; mericarps easily separated, deeply concave on the inner or commissural surface.

(b) A colorless or pale yellow liquid, having the characteristic odor and taste of coriander.

HABITAT: Southeastern Europe, China. Cultivated in America.

DISCUSSION: This is an annual plant growing about 2 feet in height. The leaves are compound. The flowers are white or rose-colored and occur in compound, terminal umbels. The fruit is globular and is composed of two concave, hemispherical portions bound together by a membraneous pericarp. Each mericarp has two oil tubes on the conjoining surface. All parts of the fresh plant are extremely fetid and when bruised emit an odor similar to that of bedbugs. The fruit becomes aromatic upon drying, developing an odor somewhat similar to that of anise. Coriander was a popular aromatic with the ancients. 1,197,820 pounds of coriander were imported in 1925.

Constituents: (*a*) The fruit: Volatile oil; fixed oil; tannin; malic acid.

(*b*) The volatile oil contains an alcohol, coriandrol or *d*-linalool ($C_{10}H_{18}O$), about 70 per cent and a terpene ($C_{10}H_{16}$).

Properties and Uses: Because of the volatile oil present, coriander is an aromatic flavor and a carminative. Thus it is used to flavor various pharmaceutical preparations, and as a corrective with purgative drugs to prevent griping.

Dose: (*a*) The fruit: 8 gr. (0.5 Gm.).
(*b*) The oil: 1½ m. (0.1 cc.).

Official Preparations: U.S.P. X.
Syrup of Senna, 2 fl. dr. (8 cc.).
Compound Spirit of Orange.

ASAFŒTIDA

(ăs′ȧ-fĕt′ĭ-dȧ)

ASAFETIDA—U.S.P.

Synonyms: Gum Asafetida; Stercus Diaboli (Devil's Dung); Cibus Deorum (Food of the Gods).

Source: Ferula Asafœtida Linné and Ferula fœtida Regel, and other species of Ferula (Fam. Umbelliferæ).

Etymology: Asafœtida from the Persian "aza," *gum*, and the Lat. "fœtida," *stinking*, referring to its odor.

Ferula, the Lat. for *rod* or *whip*, from "ferire," *to strike*, i.e., the stems of some species were used as whips.

Fœtida from the Lat. "fœtidus," *fetid* or *stinking*.

Part Used: The gum-resin obtained by incising the living rhizomes and roots. The pharmacopœia directs that asafetida must yield not less than 50 per cent of alcohol-soluble extractive and not more than 15 per cent of acid-insoluble ash.

Description and Physical Properties: A soft mass, sometimes almost semiliquid, or irregular, more or less pliable masses composed of agglutinated tears, imbedded in a yellowish-brown or dark-brown matrix, or loose ovoid tears, from 1 to 4 cm. in diameter, the surface sometimes containing streaks of violet, yellowish red or brownish red and with a few vegetable fragments; becoming hard and occasionally brittle on drying; surface of the freshly fractured tears milky-white and opaque, changing gradually on exposure to air or light to a pinkish or reddish purple or even reddish brown; on moistening with water the tears become milky-white; odor persistent, alliaceous; taste bitter, alliaceous and acrid.

Habitat: Persia, Turkestan, Afghanistan.

Discussion: This is a coarse, umbelliferous plant growing 6 or more feet in height on the mountain slopes of the afore-named countries. It has a large, fleshy taproot from 3 to 6 inches in diameter and 18 inches in length. The crown of the root is covered with coarse bristly fibers and gives rise to large radical leaves and a tall stem which is nearly destitute of leaves, but terminates in numerous umbels.

In collecting the asafetida the top of the root is sliced off during the spring. Then a protection consisting of sticks and leaves, so arranged as to exclude the sun, is built over it. The milk juice exudes from the schizogenic canals and concretes upon the cut surface. After standing for several weeks, this thickened juice is scraped off and another slice of the root removed in order to freshen the wound and again start the flow. It is again covered and left for a period of ten days. This process is repeated at intervals as long as the milk juice continues to flow. The importation of asafetida during the year 1924 amounted to 15,613 pounds.

Constituents: Resin, 60 to 70 per cent; gum, 20 to 30 per cent; volatile sulphur oil, 4 to 9 per cent; vanillin, a trace; formic, malic and ferulic acids.

Properties and Uses: Asafetida is used as a stimulant and antispasmodic in a number of nervous affections as coughs, asthma, chorea, whooping-cough, hypochondriasis and hysteria. A number of these conditions are benefited in part by its carminative, laxative and expectorant properties, promoting elimination and thus benefiting the digestion and metabolism. In some of the eastern countries asafetida is used as a condiment and seasoning for foods, as are garlic in Southern Europe and onions in this country. Thus employed, there can be no question as to its usefulness in aiding digestion and the elimination processes. The odor and taste of asafetida seem to become agreeable, or at least tolerable, to those peoples thus employing it, probably through an association of ideas in connection with its beneficial effects.

Dose: 6 gr. (0.4 Gm.).

Official Preparations: U.S.P. X.

Emulsion of Asafetida, 4 fl. dr. (15 cc.).
Pills of Asafetida, 2 pills.
Tincture of Asafetida, 15 m. (1 cc.).

SUMBUL

(sŭm′bŭl)

SUMBUL—N.F.

Synonym: Musk Root.

Source: Ferula Sumbul (Kaufmann), Hooker filius or other closely related species of Ferula (Fam. Umbelliferæ).

Etymology: Sumbul is the name of this drug in the Arabic, Persian and Hindu languages and is derived from the Arabic "sumboul," *a spike*, referring to the appearance of the flowering stem.

Ferula, the Lat. for *rod* or *whip*, from "ferire," *to strike*, because the stems of some species were used as whips.

Parts Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Sumbul:* In transverse segments, attaining a length of 10 cm. and a diameter of 7 cm.; extremely light, floating in water; externally light brown to dark brown, longitudinally wrinkled and showing in the upper portions a smooth, grayish or brownish epidermal layer, occasionally with the short stem-bases attached; fracture short, fibrous, spongy; internally light yellow or brownish yellow, arrangement of wood irregular and with yellowish-brown or blackish-resinous patches frequently extending over the entire ends of the segments. Odor peculiar, musk-like; taste bitter and somewhat aromatic.

Habitat: Central Asia, Turkestan, Bokhara, Russia, Eastern Siberia, growing on mountain slopes from 3000 to 4000-feet elevation.

Discussion: The root of this plant has long been used in India, Persia and other parts of the East as a perfume and incense in religious ceremonies. The physicians of Moscow and Leningrad (formerly St. Petersburg and Petrograd) were the first to employ it on the continent of Europe and it is still conveyed overland by way of Leningrad to the European drug markets.

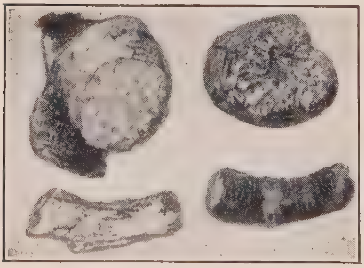


Fig. 66.—Sumbul. $\frac{1}{3}$ natural size.

Constituents: Angelic acid; volatile oil (bluish in color and of a peppermint-like taste), 1 to 2 per cent; resin, 9 per cent; valeric acid; fixed oil, 17 per cent.

Properties and Uses: Sumbul is used as an antispasmodic in epilepsy, hysteria and other nervous conditions. It is a nerve stimulant and tonic.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.
Extract of Sumbul, 4 gr. (0.25 Gm.).
Tincture of Sumbul, 1 fl. dr. (4 cc.).

(*a*) ANGELICÆ FRUCTUS

(ăn-jĕl′ĕ-kē frŭk′tŭs)

ANGELICA FRUIT—N.F.

(*b*) ANGELICÆ RADIX

(ăn-jĕl′ĕ-kē rā′dĭks)

ANGELICA ROOT—N.F.

Synonyms: (*a*) Angelica Seed.
(*b*) Holy Ghost Root; Archangel Root.

Source: Angelica Archangelica Linné, and of other species of Angelica (Fam. Umbelliferæ).

Etymology: Angelica named in honor of *Angelica*, the daughter of the King of Cathay, who is represented in Boiardo's "Orlando Innamorato" as possessed of exquisite beauty and consummate coquetry.

Fructus, the Lat. for *fruit.*

Radix, the Lat. for *root.*

Archangelica, of or pertaining to archangels, i.e., *chief angels,* a term used to denote supreme adoration.

Parts Used: (*a*) The dried, ripe fruit.
(*b*) The dried rhizome and roots.

Description and Physical Properties: (*a*) *Unground Angelica Fruit:* Cremocarps oval, externally pale yellowish brown, 4 to 8 mm. long, 3 to 6 mm. broad, 1 to 2 mm. thick; the base faintly notched; apex bearing 5 minute calyx teeth and remains of the style; mericarps joined, or separate; each mericarp nearly flat on one surface, the latter bearing a central longitudinal groove, margins sharp, slightly upturned, convex upon the other surface, and with 3 strong longitudinal ribs, the latter separated from one another by narrow grooves and from the margin by broader grooves; pericarp soft, tough and spongy; single-seeded. Odor characteristic and agreeable; taste aromatic, pungent, and sweetish.

(*b*) *Unground Angelica Root:* Rhizomes short and thick, 5 to 10 cm. long, sometimes split, frequently crowned with leaf and stem bases; roots numerous, 10 to 20 cm. long, 5 to 7 mm. thick at the base and gradually tapering to about 1 mm., frequently twisted or braided together; externally dark gray brown to reddish or purplish brown; with deep furrows; fracture smooth and short. Odor aromatic; taste sweetish, pungent, aromatic and bitter.

Habitat: Northern Europe, Siberia.

Discussion: Angelica is a sturdy, perennial, herbaceous plant growing 5 or 6 feet in height. The stems are hollow and jointed and of a purplish color. The roots are large and fleshy and have a strong, aromatic odor and a pungent, sweetish taste. They are dug in the fall and sliced longitudinally to facilitate drying. Large quantities are employed in Germany and Hungary where the plant is extensively cultivated.

Angelica fruit is a broad, oval cremocarp consisting of two mericarps usually, but not always united, each vertically grooved upon the commissural surface and showing three strong ribs upon the back. Each mericarp has six large oil tubes.

CONSTITUENTS: (*a*) The fruit: Volatile oil, 1 per cent.

(*b*) The root: Volatile oil about 1 per cent.

PROPERTIES AND USES: Both the fruits and the root of angelica are stimulant, carminative and tonic. If administered in the form of a hot infusion, they are diaphoretic; large doses, emetic.

DOSE: (*a*) The fruit: 15 gr. (1 Gm.).

(*b*) The root: 30 gr. (2 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

(*a*) Antiperiodic Pills, 1 pill.
Antiperiodic Pills without Aloe, 1 pill.
Antiperiodic Tincture, 1 fl. dr. (4 cc.).
Antiperiodic Tincture without Aloe, 1 fl. dr. (4 cc.).
(*b*) Fluidextract of Angelica Root, 30 m. (2 cc.).

APII FRUCTUS

(ā′pĭ-ī frŭk′tŭs)

CELERY FRUIT—N.F.

SYNONYM: Celery Seed.

SOURCE: Apium graveolens Linné (Fam. Umbelliferæ).

ETYMOLOGY: Apium, the Lat. for *parsley*, referring to the resemblance of the plants.

Graveolens from the Lat. meaning *a strong, offensive odor* from "gravis," *heavy*, and "olere," *to smell.*

Fructus, the Lat. for *fruit.*

PART USED: The dried, ripe fruit.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Celery Fruit:* Mericarps united or separate, ovoid, slightly curved, 1 to 2 mm. long and about half as broad and half as thick; dark brown; inner surface flat; outer surface convex, smooth except for 5 very slender light-colored ribs, 2 of which are marginal. Odor characteristic, agreeable; taste aromatic, warm and somewhat pungent.

HABITAT: Europe. Widely cultivated.

DISCUSSION: Celery is a biennial herb growing from 12 to 18 inches in height. It is extensively cultivated for its succulent leaf-stalks which have become a standard article of diet throughout the United States and parts of Europe. The fleshy roots are also gaining favor, and in France the fruits are widely employed as an aromatic seasoning for culinary purposes.

Celery fruits are very small, not more than $^1/_{10}$ of an inch in length. Each fruit consists of two crescent-shaped mericarps conjoined to form a cremocarp. Each mericarp has five yellowish ribs alternating with rather deep, brownish furrows. There are two oil canals on the commissural surface and from four to eight on the dorsal surface. 838,922 pounds of celery seed were imported in 1925.

CONSTITUENTS: Volatile oil, 2 to 3 per cent.

PROPERTIES AND USES: On account of the volatile oil present, celery fruit is carminative and slightly sedative.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Elixir of Guarana and Celery, 2 fl. dr. (8 cc.).
Fluidextract of Celery Fruit, 30 m. (2 cc.).

CHAPTER LIII

HAMAMELIDACEÆ

(hăm′ȧ-mē′lĭ-dā′sẻ-ē)

WITCH HAZEL FAMILY

This is a small family, numbering 18 genera and about 50 species. They are mostly subtropical trees and shrubs. The leaves are simple and alternate; the flowers small, perfect or polygamous (bearing both hermaphroditic and unisexual flowers on the same plant), and occur in heads, spikes or small clusters. The fruit is a woody capsule dehiscing at the summit.

(*a*) HAMAMELIDIS CORTEX—U.S.P., VIII

(hăm′ȧ-mē′lĭ-dĭs kôr′tĕks)

HAMAMELIS BARK

(*b*) HAMAMELIDIS FOLIA—N.F.

(hăm′ȧ-mē′lĭ-dĭs fō′lĭ-ä)

HAMAMELIS LEAVES

Synonyms: Witchhazel; Spotted Hazel; Snapping Hazelnut; Winterbloom.

Source: Hamamelis virginiana Linné (Fam. Hamamelidaceæ).

Etymology: Hamamelis from the Gr. "hama," *at the same time*, and "melon," *an apple*, any tree fruit; i.e., the flowers and fruits appear at the same time.

Cortex, the Lat. for "*bark*." Strictly speaking, the cortex is that portion of the stem or roots of plants which is external to the vascular tissue and, in the perennials, is known as the bark when it is modified by the formation of cork which replaces the epidermis.

Folia (sing., "folium"), the Lat. for "*leaves*."

Witchhazel, so named because the twigs were used as divining rods to indicate hidden springs, beds of ore, etc.

PART USED: (*a*) The bark and twigs.
(*b*) The leaves.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) In irregularly quilled or bent pieces, 1 to 2 mm. thick; outer surface grayish brown, with numerous lenticels; or reddish-brown, with short transverse ridges or scars, or somewhat scaly in older bark; the thin, corky layer easily removed from the pale cinnamon-colored middle bark; inner surface pale cinnamon-colored, or sometimes yellowish, smooth, or finely striate; fracture of young bark short, of old bark tough in the bast layer; odor faint; taste astringent, somewhat bitter and pungent. Twigs flexible and tough, of irregular length, not more than 6 mm. in diameter, branching, or bearing nodes at intervals of 2 to 5 cm; externally varying from yellowish brown to deep purplish brown, lightly longitudinally wrinkled, and having scattered small circular whitish or pale lenticels; bark occupying about one-fifth of the radius; wood greenish white, lightly radiate, and exhibiting one to three annual rings; pith centric, small.

(*b*) *Unground Hamamelis Leaves:* Petiole from 1 to 1.5 cm. long; lamina when entire broadly elliptical or rhomboid-ovate, usually inequilateral, mostly from 8 to 12 cm. long; apex usually acute, sometimes rounded or acuminate; base slightly heart-shaped and oblique; margin sinuate or sinuate-dentate; upper surface pale or brownish green, with a few stiff hairs; lower surface lighter in color, somewhat hairy, midrib and veins prominent, the secondary veins running straight to the margin. Odor slight; taste astringent, slightly aromatic and bitter.

HABITAT: North America, westward as far as Minnesota and Louisiana.

DISCUSSION: This is a large shrub with numerous crooked branching stems springing from the same root. It grows best on clay hills and in stony places, and is found in many localities of the eastern portion of the United States. The small yellow flowers appear in late fall and continue until midwinter. The fruit is a small nut-like capsule resembling the hazelnut. Since the fruits ripen the following fall, i.e., a year after the blooms from which they are formed, they appear at the same time as the new blossoms. When the fruits ripen they burst into two segments, ejecting the seeds with such force as to scatter them for quite a distance.

CONSTITUENTS: Tannic acid; gallic acid; resin; volatile oil.

PROPERTIES AND USES: Because of the tannic and gallic acids present in the bark and leaves of witchhazel, they are astringent, styptic, and hæmostatic. The fluidextract of the leaves and the tincture of the bark are employed as astringents in diarrhea, dysentery, and bleeding from the gums, stomach and bowel; also in hemorrhage of the nose. A salve or ointment is used as an astringent for local inflammations and as a styptic in hemorrhoids.

The distilled extract of witchhazel (made from the bark and twigs) contains neither of the acids, since neither is volatile. It is sedative and is used as a liniment in sprains, bruises and local swellings or congestions. It is also used internally for a large number of conditions, although there seems to be no practical reason for such use. It has been suggested that any value this distilled extract may have is due to its small content of alcohol.

Dose: (*a*) 30 gr. (2 gm.).
(*b*) 30 gr. (2 gm.).

Official Preparation: N.F. V.
Fluidextract of Hamamelis Leaves, 30 m. (2 cc.).

STYRAX

(stī′răks)

STORAX—U.S.P.

Synonyms: Liquid Storax; Oriental Sweetgum; Lordwood.

Source: Liquidambar orientalis Miller, known in commerce as "*Levant Storax,*" or Liquidambar styraciflua Linné, known in Commerce as "*American Storax*" (Fam. Hamamelidaceæ).

Etymology: Styrax from the Arabic "asstirax," meaning *Styrian drops,* i.e., a plant yielding a resinous exudation and growing in Styria.

Liquidambar from the Lat. "liquidus," *liquid,* and the Arabic "ambar," *amber,* i.e., liquid amber, because the fresh exudation resembles amber in color.

Orientalis from the Lat. "oriens, orientis," *the East,* from "oriri," *to rise,* i.e., the place where the sun rises, referring to its habitat.

Part Used: A balsam obtained from the trunk.

Description and Physical Properties: A semi-liquid, grayish to grayish brown, sticky, opaque mass, depositing on standing a heavy dark-brown layer (Levant Storax); or a semi-solid, sometimes a solid mass, softened by gently warming (American Storax). Storax is transparent in thin layers, has a characteristic odor and taste, and is heavier than water.

Storax is insoluble in water, but soluble, usually incompletely, in an equal weight of warm alcohol. It is also soluble in acetone, carbon disulphide, and ether, some insoluble residue usually remaining.

Habitat: Asia Minor.

Discussion: This is a small tree growing from 20 to 40 feet in height and forming entire forests along the coast in the southwestern part of Asia Minor. The balsam is not a physiological product, but a pathological secretion of the sapwood. It is found only in injured trees and occurs as a result of wound stimulation (nature's method of securing antisepsis and promoting healing). To obtain storax in quantity, the outer bark on one side of the tree is bruised, resulting shortly thereafter in filling the cambium tissue with rows of balsam glands and the inner bark with their exudation. The dead outer bark is then taken off and rejected, while the inner bark is removed and boiled in sea water whereupon the balsam rises to the surface and is skimmed off. It was once believed to be produced in the inner bark which was then collected and thrown into pits to allow of partial exudation, and ultimately subjected to pressure in strong horsehair bags.

Liquid storax is placed in barrels, goat skins, etc. and forwarded to Constantinople, Smyrna, Alexandria, Bombay and Trieste. The greatest demand for storax comes from India and China, the English-speaking people using but little. The residual bark, obtained from the process described, is dried and employed as a fumigant. 39,778 pounds of storax were imported in 1924.

CONSTITUENTS: Storax is a variable mixture consisting chiefly of resin, volatile oil, and cinnamic acid and its esters. Benzoic acid, ethyl vanillin and water are also present, the latter from 20 to 30 per cent of the entire weight. The resin consists mostly of α- and β-storesin, $C_{35}H_{58}O_3$.

PROPERTIES AND USES: As a mild antiseptic, stimulating expectorant, storax is used in chronic bronchitis and in the sub-acute stages of acute bronchitis. The benzoic and cinnamic acids and their esters are supposed to exert an antiseptic effect during their passage through the urinary tract and for that reason styrax has been used in the treatment of gonorrhea and catarrhal conditions.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Compound Tincture of Benzoin, 30 m. (2 cc.).

CHAPTER LIV

MYRTACEÆ

(mẽr-tā′sē̇-ē)

MYRTLE FAMILY

THIS family consists of trees and shrubs, numbering about 80 genera and more than 1800 species. They are characterized by the numerous stamens, cymose flowers with inferior ovary, and opposite, extipulate leaves, which contain aromatic oils. They are of wide distribution and include a number of important lumber and gum-bearing trees. The eucalyptus is coming to be regarded as among the leading lumber trees of the world. The oil occurs in pellucid oil dots or cells in the leaves.

(*a*) EUCALYPTUS

(ū̇-kā′lĭp′tŭs)

EUCALYPTUS—U.S.P.

(*b*) OLEUM EUCALYPTI

(ō-lē̇-ŭm ū̇-kā′lĭp′tī)

OIL OF EUCALYPTUS—U.S.P.

(*c*) EUCALYPTOL

(ū̇-kā′lĭp′tŏl)

EUCALYPTOL—U.S.P.

SYNONYMS: (*a*) Australian Fever Tree; Blue Gum Tree; Gumwood; Iron-bark Tree.

(*c*) Cineol.

SOURCE: (*a*) The Leaves: Eucalyptus Globulus Labillardière (Fam. Myrtaceæ).

(*b*) The Oil: Eucalyptus Globulus, Labillardière and some other species of Eucalyptus (Fam. Myrtaceæ).

ETYMOLOGY: Eucalyptus from the Gr. "eu," *well* or *good*, and "kalyptos," *covered*, i.e., the calyx is protected in the bud by a conical lid or cap which later separates entire.

Globulus, the Lat. for *little ball,* referring to the thick button-like form of the fruit.

Myrtaceæ from the Gr. "myrsine," *myrtle,* i.e., the myrtle is the type of the family.

PARTS USED: (*a*) The dried scythe-shaped leaf.

(*b*) The volatile oil distilled from the fresh leaves and containing not less than 70 per cent of eucalyptol (cineol).

(*c*) Eucalyptol: An organic oxide ($C_{10}H_{18}O$) obtained from oil of eucalyptus and from other sources.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) *Unground Eucalyptus:* Blades lanceolate, curved, from 8 to 30 cm. in length and from 2 to 7.5 cm. in breadth; apex acute or acuminate; base unequal, obtuse or rounded; petiole twisted, from 5 to 35 mm. in length; margin uneven, revolute; coriaceous; both surfaces varying from pale yellowish green to grayish green and more or less glaucous, glabrous, glandular-punctate and with numerous small, circular brown dots of cork; veins of the first order anastomosing to form a vein nearly parallel with the margin; odor aromatic; taste aromatic, bitter and cooling.

(*b*) A colorless or pale yellow liquid, having a characteristic, aromatic, somewhat camphoraceous odor, and a pungent, spicy, cooling taste.

(*c*) A colorless liquid, having a characteristic, aromatic, distinctly camphoraceous odor, and a pungent, spicy taste.

Eucalyptol is very slightly soluble in water. It is miscible with alcohol, chloroform, ether, glacial acetic acid, and with fixed or volatile oils.

HABITAT: Victoria and island of Tasmania. Cultivated in Southern Europe, Northern Africa, California and Florida.

DISCUSSION: The genus, Eucalyptus, comprises about 140 species all of which are evergreens and most of them growing to the height of 200 to 300 or more feet. Several species of eucalyptus are grown in Southern Europe and Northern Africa and some 50 or more species in California. They were brought into this country for the purpose of lessening drought. They are also valuable for destroying the miasma of marshy districts. This action has been thought to be effected partly by the diffusion of the volatile oil into the air, but is probably due to the enormous amount of water which is drawn up by the tree and evaporated into the air, thus aiding in draining the soil and depriving mosquitos of a breeding ground.

Two distinct forms of leaves are present on the Eucalyptus Globulus, those on the younger trees and the newer growths of the older trees being thin, ovate and cordate (heart-shaped) at the base, while those on the older parts are thick, sickle- or scythe-shaped and non-cordate at the base. The former contain no volatile oil and therefore have no medicinal value. The wood is resinous, very hard and durable, but in spite of this fact it is a tree of rapid growth. During 1924 there were imported into the United States 260,498 pounds of the oil of eucalyptus.

Constituents: (*a*) The Leaves: Volatile oil, 3 per cent in fresh and 6 per cent in recently dried leaves, of which the eucalyptol is the valuable portion. This may be separated from the oil by subjecting it to a low temperature whereupon the eucalyptol separates out in the form of acicular crystals.

Properties and Uses: Eucalyptol represents the medicinal virtues of the volatile oil and of the leaves of eucalyptus. It is antipyretic and antiperiodic, acting similar to quinine in intermittent fevers as in malaria but is much weaker. The expectorant and antiseptic properties are the most important, and combine to make it a useful drug. It is employed in antiseptic sprays for various infections of the nose and throat and as a vapor for fetid bronchitis. It is given internally for various infectious and catarrhal conditions of the respiratory and genito-urinary tracts. Eucalyptus trees are planted for the purpose of improving the sanitary conditions of malarial districts which it probably does by draining the soil. It is stated that the campagna di Roma has been made habitable through the planting of large numbers of eucalyptus trees.

Dose: (*a*) The leaves: 30 gr. (2 Gm.).
(*b*) The oil: 8 m. (0.5 cc.).
(*c*) Eucalyptol: 5 m. (0.3 cc.).

Official Preparation: U.S.P. X.
Fluidextract of Eucalyptus (leaves), 30 m. (2 cc.).

EUCALYPTI GUMMI

(ŭ′kā-lĭp′tī gŭm′mī)

EUCALYPTUS GUM—N.F.

Synonyms: Red Gum; Eucalyptus Kino; Australian Kino.

Source: Eucalyptus rostrata Schlechtendal and other species of Eucalyptus (Fam. Myrtaceæ).

Etymology: Eucalypti, genitive of eucalyptus, from the Gr. "eu," *well* or *good*, and "kalyptos," *covered*, because the calyx is protected in the bud by a conical lid or cap which later separates entire.

Gummi, the Lat. form from the Gr. "kommi," probably from the Egyptian "kami," any of a number of amorphous, tasteless exudations from plants.

Rostrata from the Lat. "rostrum," *a beak*, referring to the beak-like lid or cover of the calyx in bud.

Part Used: Dried, gummy exudation.

Description and Physical Properties: *Unground Eucalyptus Gum:* In dark reddish-brown grains or angular masses which in thin layers are of a transparent ruby-red color; brittle, the older surfaces sometimes dusty; forming a plastic mass and adhering to the teeth when chewed, coloring the saliva red; odor slight; taste very astringent.

Habitat: Western Australia.

Discussion: The plant yielding red gum is a very large forest tree sometimes attaining the height of 200 feet. In this respect it resembles the Eucalyptus Globulus, which yields the official volatile oil. The gum is obtained in two ways, namely by tapping the tree, collecting the red, somewhat aromatic sap and evaporating it to the proper consistence. The second method consists in locating masses of the gum which are found in some trees between the bark and wood and removing them. These pieces of gum result from the evaporation of the sap in spaces beneath the bark.

Constituents: The principal constituent is kino-tannic acid which is present to the extent of 40 to 50 or more per cent. Red gum also contains some kinoin; a little volatile oil; aromadendrin ($C_{29}H_{26}O_{12}$) and eudesmin ($C_{26}H_{30}O_8$).

Properties and Uses: The value of red gum depends entirely upon its astringency. Hence it is used to correct relaxed bowels in cases of diarrhea. It is a constituent of a number of lozenges, sprays, mouth washes and gargles used in the treatment of relaxed conditions of the mouth and pharynx.

Dose: 10 gr. (0.6 Gm.).

Official Preparations: N.F. V.

Troches of Eucalyptus Gum.

(*a*) CARYOPHYLLUS

(kăr′ĭ-ŏ-fĭl-ŭs)

CLOVE—U.S.P.

(*b*) OLEUM CARYOPHYLLI

(ō′lē-ŭm kăr′ĭ-ŏ-fĭl-ē)

OIL OF CLOVE—U.S.P.

(*c*) EUGENOL

(ū′jē-nŏl)

EUGENOL—U.S.P.

Source: Caryophyllus aromaticus Linné (Fam. Myrtaceæ).

Etymology Caryophyllus from the Gr. "karyon," *nut*, and "phyllon," *leaf*, from the appearance of the flower buds.

Aromaticus, the Lat. for *aromatic* or *fragrant*, from the Gr. "aroma," *spice*, referring to the odor.

Clove from the Lat. "clavus," or the Fr. "clou," *a nail*, because of its shape which resembles that of an old-fashioned wrought-iron nail.

PART USED: (*a*) The dried flower-buds.

(*b*) The volatile oil distilled from the dried flower buds. It must contain not less than 82 per cent by volume of eugenol ($C_{10}H_{12}O_2$).

(*c*) Eugenol: A phenol obtained from the oil of clove and other sources.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) *Unground Clove:* From 10 to 17.5 mm. in length, of a dark brown, or brownish-black color, consisting of a stem-like, solid, inferior ovary, obscurely 4-angled or somewhat compressed, terminated by 4 calyx teeth, and surrounded by a nearly globular head, consisting of 4 petals, which enclose numerous curved stamens and 1 style; odor strongly aromatic; taste pungent and aromatic, followed by slight numbness.

Stems sub-cylindrical or 4-angled, attaining a length of 25 mm. and a diameter of 4 mm., either simple, branching, or distinctly jointed, and less aromatic than the flower-buds.

(*b*) A colorless or pale-yellow liquid, becoming darker and thicker by age or exposure to the air, and having the characteristic odor and taste of clove.

(*c*) A colorless or pale-yellow, thin liquid, having a strongly aromatic odor of clove, and a pungent, spicy taste. Exposure to air causes it to become darker and thicker.

Eugenol is slightly soluble in water, but is miscible with alcohol, chloroform, ether, and with fixed oils. It is soluble in twice its volume of 70 per cent alcohol.

HABITAT: Molucca Islands (also known as "Spice Islands" and "Clove Islands"), Amboyna, Sumatra, Penang; South America, Africa, Zanzibar, West Indies.

DISCUSSION: These are small evergreen trees, pyramidal in shape. and bearing throughout the year a succession of beautiful rose-colored flowers. The flowers are disposed in terminal panicles and exhale a strong aromatic odor. When the buds first appear they are white, changing to green, then pink, and finally assuming a beautiful crimson color, at which time they are collected. Collection is done either by hand-picking or by striking the branches with bamboo poles and catching the falling buds on sheets of cloth spread under the trees. The buds are then dried by a slow fire or in the sun whereupon they assume the characteristic color of cloves, the change being due to oxidation of tannin.

Cloves were first introduced into Europe about the fourth century, by the merchants of Venice, who obtained them from the Arabs. We are told that in China, as early as 266 B.C., during the reign of the Han

Dynasty, the courtiers were accustomed to perfume their breath with cloves while addressing the sovereign. With the discovery of the

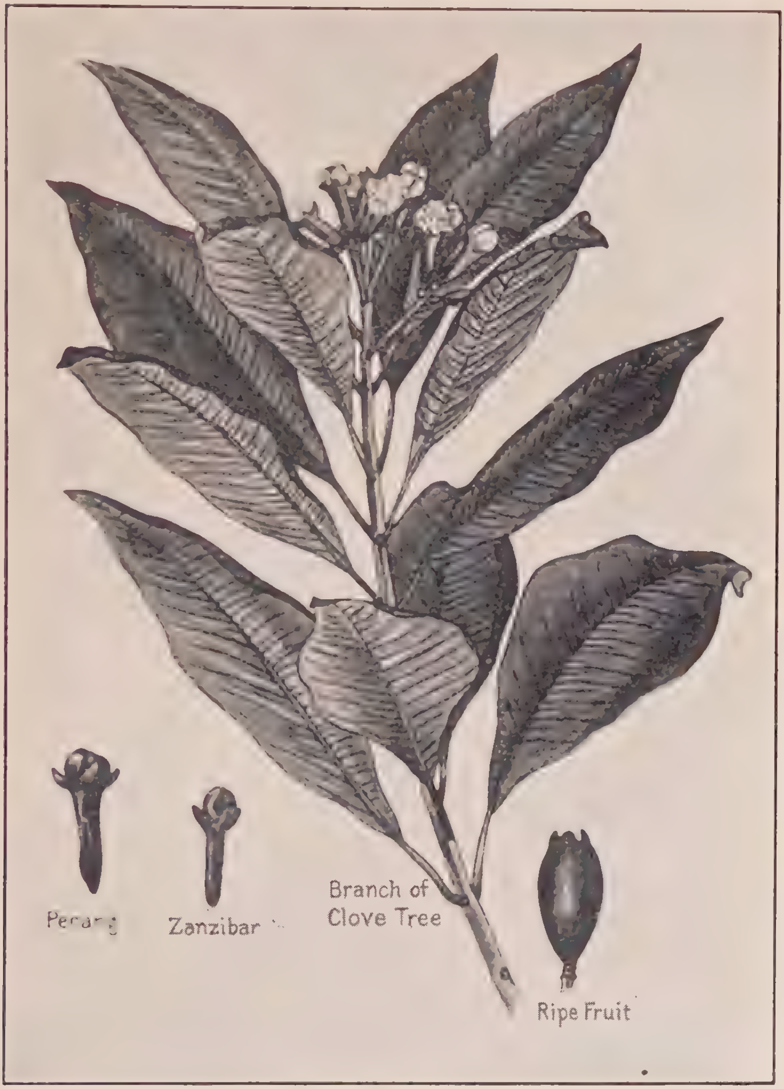


FIG. 67.—Clove, showing branch, flowers, flower-buds and ripe fruit. (Courtesy of McCormick & Company.)

"southern passage" to India, the trade in this spice passed into the hands of the Portuguese, but was subsequently wrested from them by the Dutch, who gained possession of the Molucca Islands by conquest. In an endeavor to monopolize the trade and confine the production of cloves to their own territory, the Dutch destroyed all the clove trees except those in the Islands of Amboyna and Ternate (Moluccas). Over these they maintained a rigid vigilance, to prevent trees or seedlings from being removed, but in 1770 the Governor of the Isles of France and Bourbon succeeded in obtaining some plants and introduced them into his dominions. In 1775 clove trees were introduced into Cayenne and the West Indies and from then on they continued to be transplanted to the possessions of the various countries until now they are cultivated wherever they will grow. The importation of cloves in 1924 amounted to 5,345,453 pounds, while 2680 pounds of the oil were brought in during the same period. 6,997,597 pounds of cloves were imported in 1925. About 85 per cent of all of the cloves are grown in Zanzibar. There are three commercial varieties of cloves as follows:

1. Molucca and Penang Cloves: These are the best obtainable. They are thick and heavy, dark in color, contain the greatest amount of volatile oil and are very aromatic. They come principally from Amboyna.

2. Sumatra Cloves: These are second only to the Molucca and Penang cloves and are considered by some to be equal to them in quality.

3. South American Cloves: These are usually of fair to good quality.

Cloves should either sink in water or float, heads up, in an upright position. Those that float on the water in a horizontal position, or are pale in color, feeble in taste and smell, are inferior in quality and have either been picked while immature, or have been subjected to some process for the removal of volatile oil.

CONSTITUENTS: Cloves contain about 10 to 20 per cent of volatile oil of which from 70 to 90 per cent is eugenol, $C_{10}H_{12}O_2$. Eugenol is also present in pimenta, bay, cinnamon, sassafras and camphor oils. Cloves also contain caryophyllin, $C_{15}H_{24}$; tannin, 8 to 15 per cent; resin, 6 per cent; vanillin, a trace.

PROPERTIES AND USES: The properties of cloves are dependent entirely upon the volatile oil present. The oil is stimulant, carminative and stomachic and is used in flatulence, colic and indigestion. Partly on account of these properties, and partly, no doubt, because of some inherent antispasmodic action, it relieves nausea and vomiting. Oil of clove is antiseptic and is used for that purpose in dental practice. Because of its strong irritant action, it is a useful ingredient in liniments for rheumatism and neuralgia. Either by itself, or combined with phenol or other agents, oil of clove is a valuable remedy in cases of toothache.

Dose: (*a*) Cloves: 4 gr. (0.25 Gm.).
(*b*) The oil: 1½ m. (0.1 cc.).
(*c*) Eugenol: 1½ m. (0.1 cc.).

Official Preparations: U.S.P. X.
Compound Tincture of Lavender, 30 m. (2 cc.).
Aromatic Tincture of Rhubarb, 1 fl. dr. (4 cc.).

OLEUM CAJUPUTI

(ō′lē-ŭm kăj′ŭ-pŭt′ī)

OIL OF CAJUPUT—U.S.P.

Source: Several varieties of Melaleuca Leucadendron Linné, especially the variety Cajeputi (Roxburgh) Niedenzu and the variety minor (Smith) Duthie (Fam. Myrtaceæ).

Etymology: Cajuput from the Malayese "kayu," *tree*, and "putih," *white*, referring to the color of the bark of the branches.

Melaleuca from the Gr. "melas," *black*, and "leukos," *white*, i.e., the bark of the trunk of some species is almost black while that of the branches is white or gray.

Leucadendron from the Gr. "Leukos," *white*, and "dendron," *tree*.

Minor, the Lat. for *less* or *smaller*, i.e., it is smaller than other species of the genus.

Part Used: The volatile oil distilled from the fresh leaves and twigs and rectified by steam distillation.

Description and Physical Properties: A colorless or yellowish liquid, having a peculiar, agreeable, distinctly camphoraceous odor, and an aromatic, slightly bitter taste.

Habitat: East Indies (Celebes, Buro, Amboyna, Moluccas), Philippine Islands, Indo-China, Australia.

Discussion: These trees grow with erect, but crooked stems. The branches are scattering and their twigs droop like those of the weeping willow. The bark of the trunk is gray, while that of the branches is of a pale, ash color. The bark is thick, soft and spongy. It is lamellated, shedding its exterior layer in large flakes. The leaves which are 4 or 5 inches in length and very narrow, exhale a strong aromatic odor when bruised. The flowers are small, white and inodorous. They are arranged in both terminal and axillary spikes. 5253 pounds of oil of cajuput were imported in 1924.

Constituents: The oil of cajuput contains cajuputol, which is identical with cineol or eucalyptol ($C_{10}H_{18}O$); terpineol ($C_{10}H_{18}O$). The oil is colorless when fresh, but becomes yellowish on standing. Commercial samples are sometimes greenish in color, due to a trace of copper from the still. It has a peculiar, agreeable, distinctly camphoraceous odor and a slightly bitter taste. It is imported for the most part from the Celebes Islands, but some comes from Singapore, Java and Manilla.

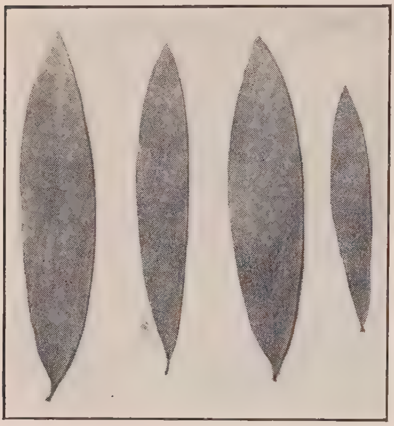


Fig. 68.—Cajuput leaves.

Properties and Uses: Oil of cajuput possesses a number of properties, such as rubefacient, counter-irritant, antiseptic and antiparasitic. Thus it is used as a counter-irritant in rheumatism, myalgia, chilblains and gout, and as an antiseptic and stimulating expectorant in bronchitis, laryngitis and pharyngitis. Its stimulant and antiseptic properties render it useful in a number of skin diseases.

Dose: 8 m. (0.5 cc.).

(*a*) PIMENTA

(pĭ-mĕn′tȧ)

PIMENTA—N.F.

(*b*) OLEUM PIMENTÆ

(ō′lē̇-ŭm pĭ-mĕn′tē)

OIL OF PIMENTA—N.F.

Synonyms: (*a*) Pimento; Allspice; Jamaica Pepper; Clove Pepper.
(*b*) Oil of Allspice; Pimento Oil.

Source: Pimenta officinalis Lindley (Fam. Myrtaceæ).

Etymology: Pimenta from the Sp. "pimienta," *pepper*, because of the resemblance of the fruits.

Officinalis from the Lat. "officina," *a workshop* or *store*, from "opus," *work*, and "facere," *to do* or *make*, i.e., kept for sale in the store.

Clove pepper from the resemblance in shape to the pepper and in odor to the clove.

Allspice because it was supposed to combine the flavors of cinnamon, nutmeg and clove.

PARTS USED: (*a*) The dried, nearly ripe fruit.

(*b*) A volatile oil distilled from the fruit. It must yield not less than 65 per cent, by volume, of eugenol, $C_{10}H_{12}O_2$.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) *Unground Pimenta:* Sub-globular, from 4 to 7 mm. in diameter, apex with four calyx teeth forming a minute ring; externally dark brown, somewhat rough and glandular-punctate; pericarp brittle, about 1 mm. in thickness; two-celled and two-seeded; dissepiments thin; seeds plano-convex, slightly reniform, externally reddish brown, smooth, somewhat wrinkled and shiny. Odor and taste, particularly of the pericarp, aromatic and distinctive.

(*b*) Oil of Pimenta is a colorless, yellow or reddish liquid, becoming darker with age and having the characteristic odor and taste of allspice.

It is soluble in an equal volume of 90 per cent alcohol; also soluble in 2 volumes of 70 per cent alcohol.

HABITAT: East and West Indies, Central and South America.

DISCUSSION: This is a beautiful tree with dense, evergreen foliage and a straight trunk covered with a smooth, gray bark. It forms large forests in the mountainous districts of Jamaica and it is from these forests that most of our supply is derived. The clusters of fruit are collected when full-grown but still unripe and are cured by drying in ovens or exposing them to the sun for 10 or 12 days.

If allowed to ripen on the tree, the fruit becomes purplish-black in color, fleshy, sweet and odorless. After drying the fruit stalks are separated and the fruit packed for shipment. Thus prepared, the fruit has an agreeable aromatic odor similar to that of a mixture of the spices mentioned. The importation for 1925 amounted to 4,114,348 pounds.

CONSTITUENTS: (*a*) The fruit: Volatile oil, 3 to 4 per cent; fixed oil, 6 to 8 per cent; resin; tannin.

(*b*) The volatile oil is extracted from the fruit by water or steam distillation and is required to yield not less than 65 per cent by volume of eugenol. In addition it contains caryophylline, $C_{15}H_{24}$; cineol and methyl eugenol. It distills over in two fractions, one lighter than water, the other heavier. These are mixed together after recovery. The fresh oil is colorless, but becomes yellowish or reddish with age. It has a characteristic odor and the taste of allspice.

PROPERTIES AND USES: Pimenta possesses the usual properties of the aromatic flavoring oils, i.e., stimulant, stomachic, carminative, condiment and flavor. Because of these properties it is used in nausea, vomiting, colic and flatulence. It is largely employed as a spice or seasoning for foods, and serves well as a corrective for nauseous or purgative drugs.

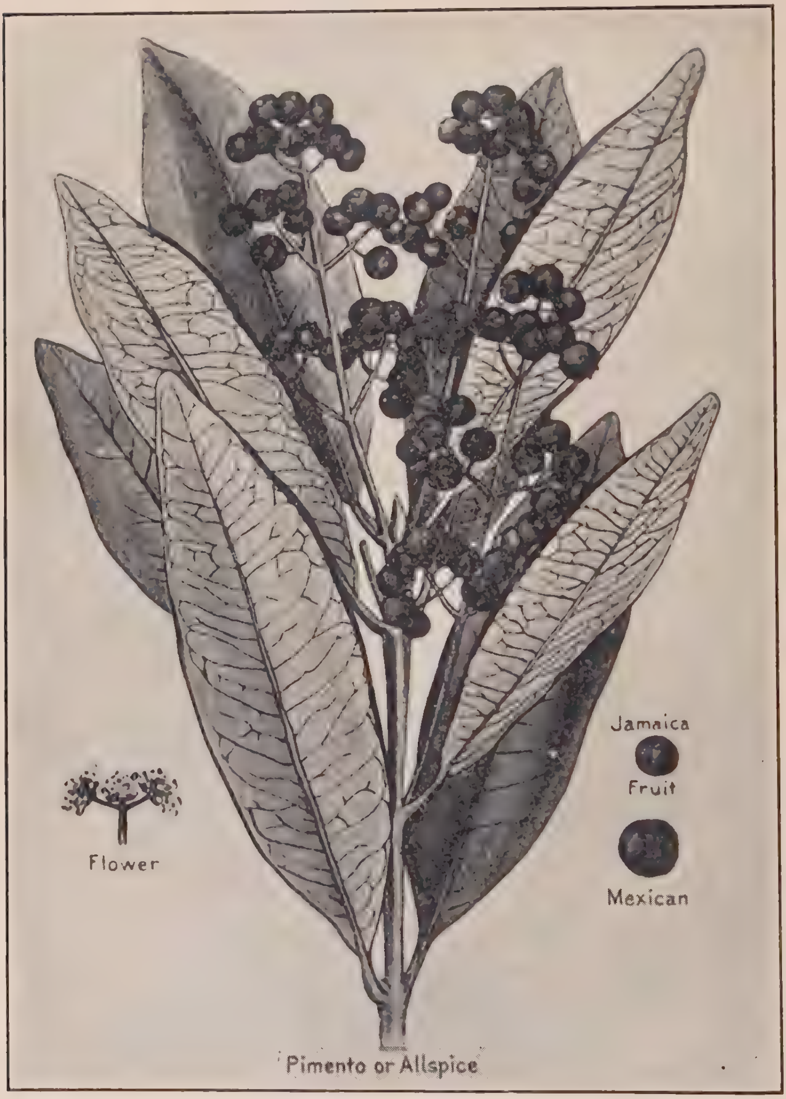


Fig. 69.—Pimenta. (Courtesy of McCormick & Company).

Dose: (*a*) The fruit: 15 gr. (1 Gm.).
(*b*) The oil: 1½ m. (0.1 cc.).

Official Preparations: N.F. V.
(*a*) The fruit: Compound Tincture of Guaiac, 1 fl. dr. (4 cc.).
(*b*) The oil: Aromatic Solution of Pepsin, 2 fl. dr. (8 cc.).
Compound Spirit of Myrcia.

OLEUM MYRCIÆ

(ō′lē-ŭm mûr′shĭ-ī)

OIL OF MYRCIA—N.F.

Synonym: Oil of Bay.

Source: Pimenta acris (Swartz) Kostel (Fam. Myrtaceæ).

Etymology: Myrcia from the Lat. "myrtus" (Gr. "myrtos"), *the myrtle*, from its resemblance to the myrtle.

Pimenta from the Sp. "pimienta," *pepper*, because of the resemblance of the berries to those of the pepper.

Acris from the Lat. "acer," *sharp*, referring to its sharp, pungent taste.

Part Used: The volatile oil distilled from the leaves.

Description and Physical Properties: Oil of Myrcia is a yellow or brownish yellow liquid having a pleasant, aromatic odor and a pungent, spicy taste.

With an equal volume of alcohol, glacial acetic acid, or carbon disulphide, it yields slightly turbid solutions. An alcoholic solution is slightly acid to litmus paper.

Habitat: West Indies.

Discussion: Pimenta acris is a beautiful tree growing from 30 to 40 feet in height. The ovate, coriaceous leaves are from 2 to 3 inches in length and exhale a pleasant odor when bruised. The flowers are small and white, tinged with red. The fruit is a globular berry, resembling allspice and is about the size of a pea. The oil is obtained by distilling the leaves with water or steam. It is a yellowish, pungent liquid, very similar to oil of clove in its aroma.

Constituents: Oil of bay contains eugenol, 60 to 65 per cent; methyl eugenol; chavicol; methyl chavicol; phellandrene; citral; myrcene.

Properties and Uses: Oil of bay is extensively employed in the perfume industry. It formerly entered into the composition of many hair tonics and dandruff preparations. It is the principal ingredient of bay rum.

Official Preparation: N.F. V.
Compound Spirit of Myrcia.

CHAPTER LV

GRANATACEÆ

(grȧ-nā-tā′sḗ-ē)

POMEGRANATE FAMILY

This is a small family consisting of but one genus and that of but two species. They have beautiful solitary flowers with numerous stamens, and an ovary with the cells in two circles.

GRANATUM

(grȧ-nā′tŭm)

POMEGRANATE—U.S.P.

Synonyms: Pomegranate Bark; Grenadier; Punic Apple; Garnet Apple; Carthaginian Apple.

Source: Punica Granatum Linné (Fam. Granataceæ).

Etymology: Punica from the Lat. "Punicus," *Carthaginian.*

Granatum from the Lat. "granum," *corn* or *seed,* from the many-seeded fruit.

Pomegranate from the Lat. "pomum," *fruit,* and "granatum," *seeded,* i.e., many-seeded fruit.

Part Used: The dried bark of the stem and root.

Description and Physical Properties: *Unground Pomegranate:* Stem bark in pieces from 2 to 8 cm. in length; bark from 0.5 to 3.5 mm. in thickness; outer surface yellowish to grayish-brown, with patches of grayish lichens, broadly elliptical lenticels and yellow-brown furrows or abraded patches of cork; longitudinally wrinkled; inner surface light yellow or yellowish-brown, finely striate; fracture short; phelloderm dark green; inner bark yellowish-green.

Root bark in transversely curved pieces; externally brownish-yellow with conchoidal depressions and dark brown irregular patches in the cork; internally dark yellow, the medullary rays extending nearly to the outer surface.

In either root or stem bark, odor slight, taste astringent, somewhat bitter and nauseous.

Habitat: Southern and Western Asia (India, Persia, Arabia, China), Japan, East Indies, West Indies, Mediterranean Basin. Cultivated in many subtropical regions; Southern United States.

Discussion: This is a small shrubby tree growing from 12 to 15 feet in height. It has opposite, entire, bright-green leaves and large, scarlet-red flowers at the ends of the young branches. The fruit is a globular berry about the size of an orange. It has a tough leathery rind of a brownish-yellow or reddish-yellow color. The fruit is divided by a conical diaphragm into upper and lower sections. The upper section is subdivided into several longitudinal compartments which are filled with seeds each covered by a thick pulp and crowded together upon the thick, spongy placenta.

Each seed consists of an outer translucent pulp and an inner hard portion which is called by some the seed proper. The edible portion of the fruit is this outer coating of the seeds. It is sweetish and pleasant but astringent to the taste. The lower section of the fruit, with its conical ceiling, is subdivided into from 2 to 5 compartments which are also filled with the same kind of seeds.

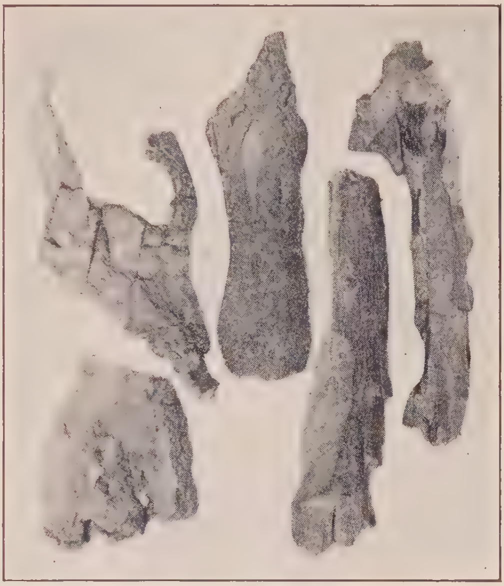


Fig. 70.—Pomegranate bark.

The pomegranate has been in use from the earliest antiquity, as is shown by the frequent references to it in the Scriptures and the numerous representations of the fruit in the sculptures of Assyria and in the ancient monuments of Egypt. Dioscorides and Pliny recommended a decoction made from the root of the pomegranate for the expulsion of tapeworm. The remedy later fell into disuse, but was revived in 1805 by physicians who found it in use among the Hindus.

The bark of the root is about three times stronger in alkaloidal content than the bark of the stem, but both deteriorate rapidly with age owing to the fact that the alkaloids are liquid and volatile. Occasionally a plant will be found with white instead of scarlet-red blossoms. For some unknown reason these show a larger alkaloidal content in the bark.

Constituents: Pelletierine, which is official in the form of the tannate. It is in reality a mixture, in varying proportions, of the three alkaloids: iso-pelletierine (iso-punicine), methyl-pelletierine (methyl-punicine) and pseudopelletierine (pseudo-punicine). Tannic acid is present to the extent of from 20 to 22 per cent. The alkaloids are named in honor of the French chemist, Pelletier, who discovered them.

Properties and Uses: Granatum is a tænifuge of considerable value and has been used as such since very remote times. It was employed by the Mohammedan physicians for the removal of tapeworm and was introduced into our medical practice about 1805.

Dose: 30 gr. (2 Gm.). Pelletierine Tannate, 4 gr. (0.25 Gm.).

Official Preparation: U.S.P. X.

Fluidextract of Pomegranate, 30 m. (2 cc.).

CHAPTER LVI

THYMELEACEÆ

(thĭm'ē̇-lē̇-ā'sē̇-ē)

MEZEREON FAMILY

This family numbers 38 genera and over 400 species and consists of tough-barked trees, shrubs and herbs. They have entire leaves and capitate apetalous flowers succeeded by drupaceous or capsular fruits. They are natives of temperate climates, mainly in the old world.

MEZEREUM

(mē̇-zē'rē̇-ŭm)

MEZEREUM—N.F.

Synonyms: Spurge Laurel; Spurge Flax; Lady Laurel; Dwarf Bay; Paradise Plant; Wild Pepper.

Source: Daphne Mezereum Linné, Daphne Gnidium Linné, and Daphne Laureola Linné (Fam. Thymeleaceæ).

Etymology: Daphne is the Gr. name of the laurel or bay tree into which, mythology tells us, a certain nymph, beloved of Apollo, was transformed. It is derived literally from "daio," *to burn,* and "thone," *a sound,* i.e., it emits a crackling sound when burning.

Mezereum from the Persian "mazariyum," the name of the plant.

Gnidium from the Lat. "gnidia," the ancient name of the laurel.

Laureola is the Lat. dim. of "laurea," *a laurel garland,* and signifies a "little laurel garland or branch."

Thymeleaceæ from the Gr. "thymelaia," *a plant,* from "thymos," *courage,* and "elaia," *olive* oil, referring to the reviving odor, or from "thyo," *to perfume,* being used in the temples as incense.

Part Used: The dried bark from the aerial portions.

Description and Physical Properties: *Unground Mezereum:* In flexible, tough quilled pieces or somewhat flattened strips attaining a length of 90 cm.; from

0.3 to 1 mm. in thickness; outer surface yellowish or olive-brown (*D. Mezereum*) or purplish brown (*D. Gnidium*) or purplish gray (*D. Laureola*), smooth, numerous lenticels giving a transversely striated appearance and occasionally with numerous circular, brownish-black apothecia; outer corky layer easily separable from the middle bark which varies from light green to olive brown and with more or less detached bast fibers; inner surface yellowish white; satiny lustrous, finely striate; fracture tough, fibrous, the inner bark lamellated. Odor very slight; taste at first slight, becoming gradually and increasingly pungent and acrid.

HABITAT: Europe, Siberia, Canada, New England.

DISCUSSION: Mezereum is a very hardy shrub growing from 3 to 4 feet in height. The leaves are about 2 inches in length and of a pale-greenish color. The clusters of pale, rose-colored flowers appear very early in the spring, before the leaves, and are very fragrant. The fruit is a bright-red berry containing a single seed. The bark is very tough and fibrous and is easily removed. It is collected during the winter, dried and tied into bundles.

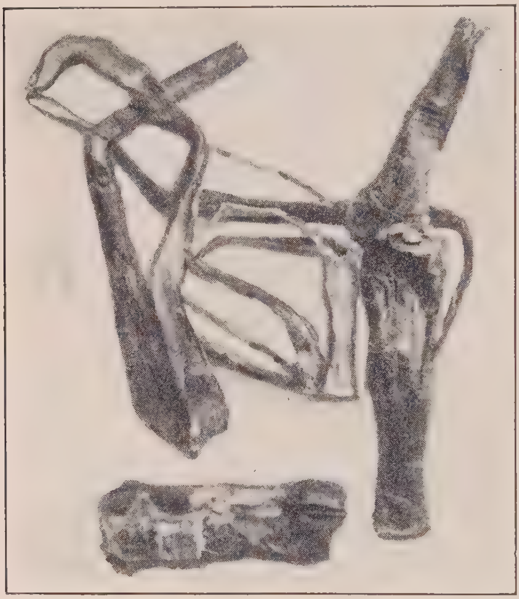


FIG. 71.—Mezereum.

CONSTITUENTS: Mezerein, an acrid resin; daphnin, a glucoside; volatile oil.

PROPERTIES AND USES: The fresh bark of mezereum is somewhat vesicant and has been used as an epispastic in the countries of Southern Europe since very early times. Taken internally it exhibits alterative effects. Because of its irritant properties it is seldom used alone. It is applied externally in liniments and plasters as a counter-irritant.

OFFICIAL PREPARATIONS: N.F. V.

Fluidextract of Mezereum.
Compound Fluidextract of Sarsaparilla, 30 m. (2 cc.).
Compound Liniment of Mustard.

CHAPTER LVII

ROSACEÆ

(rō̇-zā′sē̇-ē)

ROSE FAMILY

THIS is a large family of plants numbering about 65 genera and 1200 species. They have regular pentamerous flowers with the carpels usually numerous and distinct and becoming achenes or follicles in fruit. Besides the important genus Rosa, containing the roses, there are the Rubus, containing the raspberries and blackberries, the Malaceæ, containing the apples, the Amygdalaceæ, containing the almonds and the Fragaria, consisting of the strawberry.

ROSA

(rō′zȧ)

ROSE—U.S.P.

SYNONYMS: Red Rose; Dutch Rose; French Rose.

SOURCE: Rosa gallica Linné (Fam. Rosaceæ).

ETYMOLOGY: Rosa from the Gr. "rhodon," *red,* referring to the color of the flowers of many of the species.

Gallica from the Lat "Gallicus," *of* or *pertaining to ancient Gaul,* now France.

PART USED: The dried petals collected just before the expansion of the flowers.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Red Rose:* Petals either separate or imbricated in small cones, broadly ovate, summit rounded and deeply notched, margin entire and somewhat recurved, base obtuse; externally of a purplish-red color except the light brown claw; texture velvety; when dry brittle; odor agreeable; taste astringent and slightly bitter.

HABITAT: Western Asia and Southern Europe. Cultivated for their beauty wherever the climate is favorable to their growth.

DISCUSSION: The flowers of this species are very large and are of a rich crimson color. In the center are many yellow anthers (from the Gr. "antheros," *flowery*, from "anthein," *to bloom*, from "anthos," *a flower*), in seed plants, the part of the stamen which develops and contains the pollen, borne on thread-like filaments, and an equal number of styles (from the Lat. "stilus," *a style* or *writing instrument*, referring to their shape). The style is a filiform prolongation of the ovary, commonly bearing the stigma at its apex. It is often the conspicuous portion of the pistil, as in the lily. In many plants it is wanting, the stigma being then sessile on the ovary, each bearing a papillary stigma (the Lat. for "*mark*" or "*brand*," from the Gr. "stigma," *a spot* or *mark*, from "stigein," *to prick* or *mark*). The stigma is the receptive spot or area of the gynœcium: that part of the pistil of a flower which receives the pollen grains and on which they germinate. It usually has a moist or viscid surface of soft cells without epidermis. The stigma is usually the apex of the style or ovary. The fruit resembles a tiny apple and is of a shiny, red color. The flower buds are collected before expanding, there being two usual methods: (*a*) circumcising, in which the petals alone are obtained by cutting around the unopened corolla buds with a sharp knife, leaving the stamens behind on the calyx, and (*b*) in which the entire blossoms are cut off with scissors. They are then carefully dried by artificial heat in order to preserve the color and astringency. The importation of this drug during the year 1923 amounted to 11,665 pounds.

Constituents: Quercitannic acid; gallic acid; red coloring matter; volatile oil.

Properties and Uses: While the rose contains some volatile oil, its chief therapeutic properties are due to the quercitannic and gallic acids present. These acids render it astringent and it is employed for this property in slight bleeding and aphthous sores and ulcers of the mouth.

Official Preparations: U.S.P. X.

Fluidextract of Rose, 30 m. (2 cc.).
Honey of Rose (from Flext.), 1 fl. dr. (4 cc.).

OLEUM ROSÆ

(ō'lē-ŭm rō'zē)

OIL OF ROSE—U.S.P. VIII

Synonyms: Attar of Rose; Otto of Rose; Essence of Rose.

Source: Rosa centifolia Linné (Fam. Rosaceæ).

Etymology: Oleum, the Lat. for "*oil.*"

Rosæ from the Gr. "rhodon," *red,* referring to the color of the flowers of many of the species.

Centifolia from the Lat. "centum," *one hundred,* and "folium," *leaf,* referring to the numerous petals.

Attar from the Persian "'atar," *perfume* or *essence,* from "'atara," *to smell sweet,* referring to the odor.

Otto is a corrupted form of attar.

Part Used: The volatile oil distilled from the fresh flowers.

Description: A pale yellowish, transparent liquid, having the strong, fragrant odor of rose, and a mild, slightly sweetish taste.

Habitat: European Turkey, especially in the Balkan Mountains, Bulgaria, Asia Minor; also in a small way in Southern France, Egypt, Persia, India.

Discussion: More than 7000 varieties of roses are cultivated for their beauty, but only a few are used for the recovery of the oil. Prominent among these is the Rosa centifolia. No description is necessary since their general appearance is alike. It is more fragrant than most varieties.

While all of the afore-named countries contribute to the production of oil of rose, a brief description of the methods employed by the rose farmers of Bulgaria will suffice to convey a fairly clear idea of the manner in which the industry is carried on. The sandy soil of Bulgaria, permitting of easy drainage, together with an ideal climate, gives to that country a decided advantage in the production of this product as may be judged from the fact that it produces annually several thousand pounds of this valuable commodity. The Rosa damascena is largely employed by the farmers of Bulgaria, but the method of recovery of the oil is essentially the same no matter from what particular variety it is obtained. Two varieties of roses are grown, one (the Rosa centifolia or the Rosa damascena) for the recovery of oil, and the white rose (Rosa alba) which serves principally as a hedge to separate the adjoining farms. The white rose contains but little oil, but since it is very rich in the stearopten content, it is sometimes mixed with the others to increase the percentage of crystallizable stearopten which has long been considered a criterion of purity.

The Damascus rose is grown in thick rows on the southern slopes of the Balkan Mountains, adjoining farms being separated by a row of white roses as already indicated. The flowers are collected in May and June and subjected to steam distillation for the recovery of the oil. From 40 to 60 pounds of roses are placed in a still at a time. The alembic is the conventional type and is made of tinned copper. Water is added and the roses boiled for about two hours, the oil and water, of course, distilling over together. As this distillate cools, the oil separates and rises to the top leaving the water saturated with oil to the limit of its solvent powers. The oil is separated by decantation or by the use of a pipette. The remaining water, saturated with oil, constitutes the "Stronger Rose Water" of the pharmacopœia. Several million gallons of this are sold on the market each year. That which is not sold is returned to the still with the next batch of roses to be exhausted. From 3000 to 6000 parts of rose petals are required to yield 1 part of oil.

The oil, as thus recovered, is a pale-yellowish liquid of characteristic odor and taste. It has a specific gravity of from 0.855 to 0.865 at 25° C. The addition of 70 per cent alcohol precipitates the stearopten portion of the oil, but dissolves the eleopten or liquid portion. The oil congeals at from 18° to 22° C. 56,830 ounces of oil of rose were imported in 1925.

Constituents: Oil of rose consists of two portions, as indicated; a stearopten which is solid at ordinary temperatures when by itself, and an eleopten which remains liquid. These may be separated by congealing the oil and compressing between sheets of bibulous paper whereupon the eleopten is absorbed and may be later recovered in a pure condition. The eleopten is oxygenated, while the stearopten, which is odorless when pure, consists of a mixture of several hydrocarbons. The eleopten consists of two alcohols, geraniol ($C_{10}H_{18}O$) and citronellol ($C_{10}H_{18}O$). These are in the proportion of approximately three to one in the order named. While these two alcohols occur in the oil mainly in the free state, esters of both, amounting to 2 or 3 per cent are also found.

In order to prevent, as far as possible, the adulteration of oil of rose, the U.S.P. VIII required that the oil have a saponification value of not less than 10 and not more than 17. This saponification value, or "number," is a value obtained in the analysis of oils, fats, etc., being the number of mg. of KOH neutralized on saponification by one gram of the oil or fat being tested. The saponification equivalent is found by dividing the "number" into the molecular weight of KOH and multiplying the result by 1000; it indicates the number of grams of the fat or oil saponified by a gram molecule of any alkali.

Properties and Uses: The only properties possessed by oil of rose are those of a perfume and flavor. Thus it enters largely into the manufacture of perfumes and as a flavoring agent into toilet preparations. On account of its agreeable odor, which seems to be a universal favorite, it may be fairly said that its use is limited only by its price.

RUBUS

(rōō bŭs)

RUBUS—N.F.

SYNONYMS: Blackberry; Finger-berry; Bramble-berry.

SOURCE: Plants belonging to the section Eubatus Focke, of the genus Rubus Linné (Fam. Rosaceæ).

ETYMOLOGY: Rubus, the Lat. for "*bramble*," from "ruber," *to be red*, referring to the color of the juice of the fruit.

PART USED: The dried bark of the rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Rubus:* In elongated, tough, flexible quills or bands, from 3 to 6 mm. in diameter, the bark from 1 to 2 mm. in thickness; outer surface deep red-brown or dark gray-brown, occasionally blackish brown, somewhat scaly; inner surface yellow or pale brown, strongly and coarsely long straight-striate; fracture tough-fibrous; readily splitting. Inodorous; taste strongly astringent and bitter.

HABITAT: Eastern portion of the United States in fields and thickets and along fences.

DISCUSSION: Of the many species of Rubus, some 35 are native in the United States. Most of them are briers, but a few have annual stems without prickers. They are divided into two groups: (*a*) the raspberries, in which the edible fruit is composed of an aggregate of pulpy, one-seeded, coherent little drupes, separating from the dry receptacle when the berry ripens, and (*b*) the blackberries, in which the receptacle is juicy and coheres with the drupe to form the fruit.

All of the official species are pubescent perennials having angular, woody stems armed with stout recurved prickers. The reason for not including the "*low*" or "*running*" blackberries, or dewberries (Rubus canadensis and Rubus trivialis) is because of the fact that their roots grow straight down and are very thin, rendering collection very difficult.

CONSTITUENTS: Tannic acid, 10 to 16 per cent; gallic acid, about 0.5 per cent; villosin, a saponin.

PROPERTIES AND USES: On account of the nature of the tannic and gallic acids present in blackberry bark, it possesses an astringency that is at once mild and effective. Because it is more agreeable to the taste than most tannin-bearing drugs, rubus is employed in internal remedies. Blackberry cordials, in which the preparations of the bark are flavored with the syrup of the fruit, are very popular medicines for summer complaint and the diarrhea of children.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Fluidextract of Rubus, 15 m. (1 cc.).

Syrup of Rubus, 1 fl. dr. (4 cc.).

BRAYERA

(brā-ĕr′ä)

BRAYERA—N.F.

Synonyms: Kousso; Cusso.

Source: Hagenia abyssinica (Bruce) Gmelin (Fam. Rosaceæ).

Etymology: Brayera, given in honor of Dr. Brayer, a French physician who lived in Constantinople during the early part of the last century and published a treatise on kousso in 1832.

Cusso is the native Abyssinian name of the plant.

Hagenia named for Karl Gottfried Hagen, a German botanist (1749 to 1829).

Abyssinica refers, of course, to the habitat of the plant.

Part Used: The panicles of the pistillate flowers.

Description and Physical Properties: *Unground Brayera:* In reddish brown rolls or flattened bundles 25 to 50 cm. long, or occurring more or less loose and stripped from the larger portions of the panicles. Panicle branches cylindrical, somewhat flattened, longitudinally furrowed or wrinkled, externally light brown to yellowish, tomentose, glandular; cork brownish, bast and wood fibers yellow, fibro-vascular bundles in wedges, pith large and yellowish brown; nodes distinct, each with a scar or branch and subtended by a sheathing bract; internodes mostly 1 to 2 cm. long. Flowers subtended by 2 ovate, reddish, pubescent and glandular bracts; pedicel short; calyx turbinate, pubescent below, subtended by 4 or 5 rigid, spreading, obovate, purple-veined bractlets which are persistent and elongated in fruit, alternating with and larger than the 5 usually shriveled, reflexed calyx lobes; petals 5, caducous, and usually absent in the drug; carpels 2; styles exserted, stigmas broad and hairy with prominent papillæ; fruit an ovoid achene about 2 mm. in diameter, enclosed by the remains of the calyx. The staminate flowers are greenish yellow, with about 20 fertile stamens. Odor slight; taste bitter.

Habitat: Abyssinia.

Discussion: This is a small tree, about 20 feet in height, found growing on the high table-lands and in the mountainous districts of Abyssinia at an elevation of from 3000 to 8000 feet above sea level. On Mt. Kilimanjaro, the highest peak in Africa (19,318 ft.), it has been found at an elevation of nearly 10,000 feet. So far, no other species of the genus Hagenia have been discovered.

Both pistillate and staminate flowers grow on the same tree, but in separate clusters. The panicles of pistillate flowers are collected and dried, loose, then tied into bundles for the market. Each panicle consists of a zigzag stalk with branches at each bend. These bear the flowers which are small and of a greenish color at first, but later become purple.

Constituents: Brayera contains a number of proximate principles which are closely related chemically. Kosotoxin, $C_{26}H_{34}O_{10}$, is stated to be the active vermicidal constituent and a heart depressant. Associated constituents are α- and β-kosin and protokosin which are believed to be devoid of the action attributed to brayera. The market affords an active product known as koussin, which, however, is not an individual chemical compound.

Properties and Uses: The medicinal virtue of brayera is represented by its anthelmintic and tænifuge properties. The drug has been used against both the roundworm and the tapeworm since very early times, and while its action often is very severe when administered in excessive doses, when used with moderation it is one of the most valuable remedies we have for the removal of tapeworm. The patient should be properly prepared by first abstaining from food for two or three meals, followed by a cathartic in the evening and the brayera administered the following morning. In case the drug does not act within 4 to 6 hours, another dose of cathartic should be administered to aid in the removal of the brayera as well as of any parasite.

Dose: 240 gr. (15 Gm.).

Official Preparation: N.F. V.

Infusion of Brayera, 8 fl. oz. (250 cc.).

PRUNUS VIRGINIANA

(pro͞o′nŭs vẽr′-jĭn′ĭ-ȧ-nȧ)

WILD CHERRY—U.S.P.

Synonyms: Wild Black Cherry; Black Chokecherry; Cabinet Cherry; Rum Cherry.

Source: Prunus serotina Ehrhart (Fam. Rosaceæ).

Etymology: Prunus, the Lat. for *a plum tree*, referring to the appearance of the tree.

Serotina from the Lat. "serotinus," *that which comes* or *happens late*, from "serus," *late*, i.e., it blooms later than other species.

Part Used: The bark of the stem collected in autumn and carefully dried.

Description and Physical Properties: *Unground Wild Cherry:* Usually in transverse curved pieces up to 8 cm. in width and from 0.5 to 8 mm. in thickness;

outer surface of rossed bark light brown or greenish-brown, smooth, except for numerous lenticel-scars; outer surface of unrossed bark reddish-brown, glossy, smooth, with light colored, transversely elongated lenticels or roughened and flaky with gray lichens; inner surface light brown, with delicate, reticulate striations and numerous minute fissures; fracture short, granular; odor distinct, resembling bitter almond when macerated in water; taste astringent, aromatic, and agreeably bitter.

Habitat: North America from Canada to Florida and westward to Minnesota and Kansas.

Discussion: The genus Prunus includes the peach, plum, apricot and cherry and comprises about 120 species. Of these about 40 are native in the United States. It is unfortunate that Prunus virginiana was chosen as the official title of this drug, since it is also the botanical name of the chokecherry. The wild cherry is a large tree, often growing from 50 to 100 or more feet in height and several feet in diameter, while the chokecherry is small, growing from 10 to 15 feet in height. The fruit of the wild cherry is a small, black, edible drupe, while that of the chokecherry is red in color and extremely astringent.

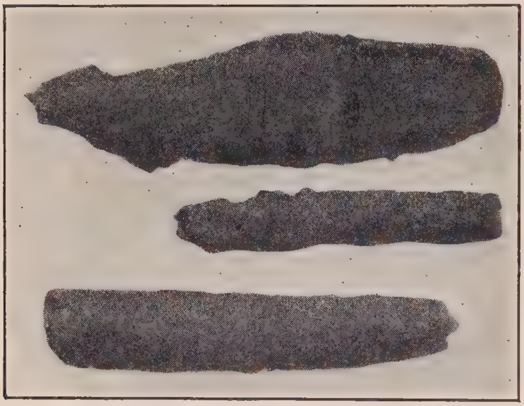


Fig. 72.—Wild Cherry bark.

Constituents: Wild cherry bark contains a glucoside called "*amygdalin*" and a ferment known as "*emulsin*." In the presence of water, the ferment acts upon the glucoside, decomposing it with the formation of benzaldehyde, hydrocyanic acid and glucose. There is also present a considerable amount of tannic acid and a bitter principle. These constituents occur in the bark of all parts of the tree, but the bark of the root is the most active.

In the manufacture of galenical preparations it is necessary to use as little heat as possible, since too high a temperature will destroy the ferment upon which the formation of one of the active principles, hydrocyanic acid, depends. The aqueous preparations of wild cherry contain, in addition to the benzaldehyde and hydrocyanic acid, a bitter principle which is the tonic constituent.

Properties and Uses: On account of the bitter principle contained in wild cherry bark, it acts as a bitter tonic, but is seldom used for this purpose. Its principal use is in cough preparations, the theory being that the tannic acid corrects relaxed conditions of the mucous membranes of the throat while the hydrocyanic acid serves as a sedative to irritated tissues.

Dose: 30 gr. (2 Gm.).

Official Preparation: U.S.P. X.

Syrup of Wild Cherry, 2½ fl. dr. (10 cc.).

(*a*) AMYGDALA DULCIS

(ȧ-mĭg′-dȧ-lȧ dŭl′-sĭs)

SWEET ALMOND—U.S.P. IX

(*b*) OLEUM AMYGDALÆ EXPRESSUM

(ō′lē̇-ŭm ȧ-mĭg′dȧ-lē ĕks-prĕs′ŭm)

EXPRESSED OIL OF ALMONDS—U.S.P.

Synonyms: (*a*) Jordan Almond; Sweet Almond.
(*b*) Oil of Sweet Almonds; Expressed Oil of Almonds.

Source: (*a*) Prunus Amygdalus dulcis De Candolle (Fam. Rosaceæ).
(*b*) Varieties of Amygdalus communis Linné (Fam. Rosaceæ). (Obtained from both sweet and bitter almonds.)

Etymology: Amygdalus, the Lat. name of the almond tree, from the Gr. "amygdalos," *the almond tree.*
Communis, the Lat. for *common*, i.e., the usual variety.

Part Used: (*a*) The kernels of the ripe seeds.
(*b*) The fixed oil obtained from the kernels of both the sweet (dulcis) and bitter (amara) varieties of almond.

Description and Physical Properties: (*a*) Ovate or oblong lanceolate, 17 to 25 mm. in length, 10 to 13 mm. in breadth and 4 to 7 mm. in thickness; seed-coat light brown with numerous parallel veins, thin and easily removed on soaking the seed in water; embryo straight, white, and with two plano-convex cotyledons; taste bland, sweet.

(*b*) A clear, pale straw-colored or colorless, oily liquid. It is almost odorless, and has a bland taste.

It is slightly soluble in alcohol, but is miscible with ether, chloroform, benzene, and with petroleum benzin.

Habitat: Southern Europe, Southern California, Western Asia, Northern Africa.

Discussion: The almond tree resembles somewhat the peach or apricot, growing from 15 to 20 feet in height and dividing into numerous spreading branches. The leaves are very similar to those of the peach, while the flowers are white or pink in color and somewhat larger than peach blossoms. From a botanical point of view, there seems to be no special feature to distinguish the sweet almond from the bitter. Accordingly they are both classified as varieties of Amygdalus communis.

The fruit of the almond is a drupe whose sarcocarp is velvety and non-edible. On ripening, this outer portion dehisces and drops off, leaving the pit hanging to the tree. The pit is peculiar in that it is perforated with many irregular holes or pores. The almond tree has been known since very remote times as is evidenced by the fact that mention is made of it at least twice in the Old Testament (Numbers XVII-8 and Jeremiah I-11). The statistics for 1924 show that 25,453,893 pounds of bitter and sweet almonds were imported. During the same period 69,607 pounds of the expressed oil were brought in. The sweet almond seed is larger and longer in proportion to its width than the bitter almond. It is sweet in taste, edible, wholesome, nutritious and does not yield either hydrocyanic acid or benzaldehyde upon maceration with water. When soaked in warm water for a few moments the seed-coat may be removed very easily. Almond seeds whose seed-coat has been removed are known as "blanched" almonds.

After the recovery of the fixed oil the "cake" from the sweet almond is ground into a meal. Since this contains no starch, it is made into several articles of food (bread, cakes, puddings, etc.) for the treatment of diabetics. The meal also finds employment in various toilet preparations. During the year 1925 there were imported 16,144,335 pounds of shelled almonds and 4,152,113 pounds of unshelled almonds.

Constituents: Sweet almonds, as well as the bitter variety, contain a bland fixed oil to the extent of about 50 per cent of their weight.

Properties and Uses: Both the sweet almonds and the expressed oil are nutrient, emollient and demulcent. The kernels are roasted and used as a popular confection.

Official Preparation: U.S.P. X.

The expressed oil:

Ointment of Rose Water.

(*a*) AMYGDALA AMARA

(ȧ-mĭg-dȧ-lȧ ȧ-mā′rȧ)

BITTER ALMOND—U.S.P. VIII

(*b*) OLEUM AMYGDALÆ EXPRESSUM

(ō′lē̇-ŭm ȧ-mĭg′dȧ-lē ĕks-prĕs′ŭm)

EXPRESSED OIL OF ALMONDS—U.S.P.

(*c*) OLEUM AMYGDALÆ AMARE

(ō′lē̇-ŭm ȧ-mĭg′dȧ-lē ȧ-mā′rē)

OIL OF BITTER ALMOND—U.S.P.

Synonyms: (*a*) Greek Nuts.
(*b*) Oil of Sweet Almond.
(*c*) Bitter Almond Oil; Volatile or Essential Oil of Almonds.

Source: (*a*) Amygdalus communis Linné, Prunus Amygdalus Stokes var. amara De Candolle (U.S. P. VIII) (Fam. Rosaceæ).

(*b*) Varieties of Amygdalus communis Linné (Fam. Rosaceæ). (Obtained from both bitter and sweet almonds.)

(*c*) Amygdalus communis Linné, or from other kernels containing amygdalin.

Etymology: Amygdalus, the Lat. name of the almond tree, from the Gr. "amygdalos," *the almond tree.*

Amara, the Lat. for *bitter,* referring to the taste.

Dulcis, the Lat. for *sweet,* referring to the taste.

Part Used: (*a*) The kernels of the dried, ripe seeds.

(*b*) The fixed oil obtained from the kernels of both the sweet (dulcis) and bitter (amara) varieties of almond.

(*c*) The volatile oil obtained by maceration with water and subsequent distillation with steam from the ripe kernels which have been deprived of the fixed oil. It is required by the pharmacopœia to yield not less than 85 per cent of benzaldehyde (C_7H_6O) and not less than 2 per cent and not more than 4 per cent of hydrocyanic acid (HCN). The botanical source from which the oil is derived is required to be stated on the label.

Description and Physical Properties: (*a*) Ovate or oblong-lanceolate, 20 to 30 mm. long; seed-coat thin, brown, finely downy; embryo straight, white, and with two plano-convex cotyledons; taste bitter and oily; when triturated with water Bitter Almond yields a milky-white emulsion which emits an odor of hydrocyanic acid.

(b) A clear, pale, straw-colored or colorless, oily liquid. It is almost odorless, and has a bland taste.

It is slightly soluble in alcohol, but is miscible with ether, chloroform, benzene, and with petroleum benzin.

(c) A clear, colorless or yellow, strongly refractive liquid, having the characteristic odor and taste of benzaldehyde.

When first prepared, the Oil is neutral to moistened litmus paper, but afterward develops an acid reaction, due to the formation of benzoic acid.

HABITAT: Persia, Syria, China, Asia Minor. Cultivated in European countries bordering on the Mediterranean Sea and in California.

DESCRIPTION: Very similar to the sweet or Jordan almond except that it is somewhat smaller and broader in proportion to its length. The taste is bitter. Upon chewing, the flavor and odor of bitter almond oil, or benzaldehyde, and of hydrocyanic or prussic acid, is developed. The kernels of bitter almond are poisonous and therefore not edible.

DISCUSSION: The statements respecting sweet almond on page 314 apply equally to the bitter almond for which reason repetition is not necessary. During 1924, 6855 pounds of oil of bitter almonds were brought into this country.

CONSTITUENTS: (a) Bitter almonds, like the sweet variety, contain about 50 per cent of a bland fixed oil which is obtained by expression and which consists essentially of olein with a small amount of linolein.

They also contain a crystallizable glucoside called "amygdalin" and a ferment known as "emulsin." In the presence of water this ferment decomposes the glucoside, forming benzaldehyde, the principal or character-giving constituent of the volatile oil of bitter almond, and hydrocyanic acid and glucose.

PROPERTIES AND USES: The bitter almond seeds are poisonous and are used only for the recovery of the oils. It is widely employed as a flavor. Note: in this latter connection it should be pointed out that the pharmacopœia states that "this oil is intended for *medicinal* use and neither it nor its solution should be used or sold for flavoring foods."

Natural oil of bitter almond, free from hydrocyanic acid, can be purchased from all dealers in essential oils. It is such oil only that may be used safely in quantity in flavoring food products.

DOSE: Oil of Bitter Almond: ½ m. (0.03 cc.).

OFFICIAL PREPARATION: U.S.P. X.

Expressed Oil:

Ointment of Rose Water.

QUILLAJA

(kwĭ-lā′yȧ)

QUILLAJA—N.F.

Synonyms: Soapbark; Panama Bark; China Bark; Murillo Bark; Cullay.

Source: Quillaja Saponaria Molina (Fam. Rosaceæ).

Etymology: Quillaja from the Chilean "quillean," *to wash*, referring to its employment for cleansing certain fabrics.

Saponaria from the Lat. "saponarius," *soapy*, from "sapo," *soap*, because it produces a suds with water.

Part Used: The dried, inner bark.

Description and Physical Properties: *Unground Quillaja:* In flat pieces of variable length, from 3 to 8 mm. in thickness, or in small chips; outer surface brownish white, sometimes with a very few small patches of cork attached, otherwise nearly smooth; inner surface yellowish white, nearly smooth, with occasional circular depressions, conical projections or transverse channels; fracture uneven and strongly fibrous, the laminæ oblique to each other. Odor slight; taste acrid.

Habitat: Peru, Chili. Cultivated in Northern Hindustan.

Discussion: Quillaja is a medium sized tree with alternate, oblong leaves. Both pistillate and staminate flowers occur on the same branch. They are axillary and without corolla. The wood is very hard and the bark thick and fibrous. It is well named "*soapbark*," since its powder when agitated with water produces a copious lather-like suds. The powdered bark is strongly sternutatory, due to the fine crystals of calcium oxalate present. These occur in the form of elongated prisms and may be easily recognized under the microscope. These crystals, together with the bast fibers, form the basis of identification of the powdered bark. 351,339 pounds of quillaja were imported in 1924.

Constituents: Quillajic acid, a poisonous, physiologically active modification of quillaja saponin; quillaja sapotoxin; quillaja saponin, all of which have the empirical formula $C_{19}H_{30}O_{10}$; a glucoside, about 9 per cent, and calcium oxalate.

Properties and Uses: Soapbark is irritant and expectorant, but should not be employed internally as a medicine because of its depressant effect upon the heart and respiration. This may be dangerous if taken in large amounts. The finely powdered bark is irritant to the respiratory passages and has been used as a snuff in coryza and rhinitis. The dried extract has also been used for emulsifying the fixed oils as castor and codliver oils but should not be so used. An infusion of soapbark is used to wash delicate fabrics.

Official Preparations: N.F. V.
Coal Tar Solution.
Tincture of Quillaja.

PRUNUM

(prōō′nŭm)

PRUNE—N.F.

Source: Prunus domestica Linné (Fam. Rosaceæ).

Etymology: Prunum, the Lat. for *plum.*
Prunus, the Lat. for *plum tree.*
Domestica, the Lat. for domestic, from "domus," *house,* i.e., domesticated or grown about the house.

Part Used: The partially dried, ripe fruit.

Description and Physical Properties: Oblong, ellipsoidal, more or less compressed, from 3 to 4 cm. long; externally brownish black, shriveled; the sarcocarp sweet and acidulous; putamen hard, smooth or irregularly ridged; seed shaped like that of the almond but smaller, and of a bitter-almond taste.

Habitat: The prune tree is thought to have originated in southwestern Asia, but is now grown in all temperate climates.

Discussion: The character of this tree and its fruit are too well known to require any description here. For the preparation of prunes, the fruit is collected when ripe and partially dried. This may be accomplished entirely in the sun, if the weather is favorable, or by artificial heat. Enormous quantities of prunes are consumed annually as a food, a large proportion of those used in this country coming from California. The California product is larger than the European, but not so highly flavored and probably less active as a laxative.

Constituents: Sugar, 25 to 40 per cent; organic acids; pectin. The kernel of the pit contains fixed oil, also emulsin and amygdalin which, in the presence of water, yield hydrocyanic acid, benzaldehyde and glucose, like the seeds of the bitter almond.

Properties and Uses: Prunes serve the double purpose of an agreeable, nutritious fruit and a mild laxative in chronic constipation. If a few senna leaves be added during the cooking process, the laxative quality is increased without detriment to the flavor. Although the amount eaten may be "ad libitum," excessive quantities have a tendency to cause griping and colic.

Official Preparation: N.F. V.
Confection of Senna, 60 gr. (4 Gm.).

RUBI IDÆI FRUCTUS

(rōō′bī ī-dē′ī frŭk tŭs)

RASPBERRY—N.F.

Synonyms: Red Raspberries; European Raspberry; Hinberry.

Source: Varieties of Rubus Idæus Linné or of Rubus stigosus Michaux (Fam. Rosaceæ).

Etymology: Rubus, the Lat. for "*bramble*," from "ruber," *red*, from "rubere," *to be red*, referring to the color of the juice of several of the species.

Idæi from the Gr. "Idaios," from "Ide" (Lat. "Ida"), *of* or *pertaining to Mt. Ida.* There were two Mt. Idas, anciently famous, one in Crete and one in Asia Minor.

Strigosus, the Lat. for "*lean.*" The word is used in a botanical sense to mean "*set*, or *covered, with stiff bristles*," referring, of course, to the character of the plant.

Part Used: The fresh, ripe fruit.

Description and Physical Properties: An aggregate fruit, globular or hemispherical with a concave depression at the base where separated from the receptacle, composed of twenty or more small, rounded-polygonal, succulent drupelets; pericarps externally red, non-globular hairs numerous up to 0.640 mm. in length; mesocarps fleshy, juice red; parenchyma with rosettes of calcium oxalate up to 0.035 mm. in diameter; endocarps small stones with wrinkled surfaces. Odor characteristic, aromatic; taste pleasant, sweet, acidulous.

For pharmaceutical purposes, Black Raspberries, the fresh ripe fruit of varieties of *Rubus occidentalis* Linné (Fam. *Rosaceæ*) may be substituted either in part or wholly for Red Raspberries.

Habitat: Europe, Northern Asia. Cultivated in all temperate climates.

Discussion: The raspberry is a perennial, herbaceous plant growing from 3 to 5 feet in height. It has many angular, thorny stems bearing whitish, downy leaves and small white flowers. Rubus strigosus is our native red raspberry, with which all doubtless are familiar.

The fruit of the raspberry is an aggregate of many contiguous, but non-coalescent black (or red), rounded drupelets which adhere to a soft, fleshy torus. On ripening, this aggregate berry cleaves loose from the torus like a cap, hence the common name, black (or red) caps.

Constituents: Sugar; citric acid; a little acetic acid and pectin.

Properties and Uses: Raspberries possess no distinctly medicinal action, but the syrup serves as a pleasant vehicle or adjuvant to many remedies of a less pleasing taste. The juice is, to some extent, refrigerant and the berries form an edible fruit of exquisite taste and considerable value.

Official Preparations: N.F. V.
Syrup of Raspberry.
Glycerinated Elixir of Gentian, 2 fl. dr. (8 cc.).

SUCCUS POMORUM

(sŭk′ŭs pŏ-mō′rŭm)

FRESH APPLE JUICE—N.F.

Synonym: Sweet Cider.
Source: Cultivated varieties of Pyrus Malus Linné (Fam. Rosaceæ).
Etymology: Succus, the Lat. for "*juice*."
Pomorum from the Lat. "pomum," *fruit*. Pomona was the old Italian goddess of the fruit tree.
Pyrus from the Lat. "pirus," *a pear tree*.
Malus the Lat. for "*apple tree*," from "malum," *apple*, probably from the Gr. "melon," *fruit*.
Part Used: The freshly expressed juice of sound, ripe, sour apples.
Habitat: Universally cultivated wherever the climate is suitable.

Discussion: The apple tree is too well known to require any description here.

Constituents: Apple juice contains malic acid, a small amount of amyl valerate, some sugar and varying amounts of pectin.

Properties and Uses: Apple juice is laxative and may be employed in constipation. It is slightly refrigerant, and if administered cold, relieves thirst in cases of fever and inflammations.

Dose: Ad libitum. (The N.F. indicates no dose).

Official Preparation: N.F. V.
Ferrated Extract of Apples, 10 gr. (0.65 Gm.).

CHAPTER LVIII

SAXIFRAGACEÆ

(săk′sĭ-frȧ-gā′sē̇-ē)

SAXIFRAGE FAMILY

This is a large family of herbs, of variable habit and wide distribution. It comprises 70 genera and about 600 species. They are usually characterized by a free bicarpellary ovary, by having as many as twice the number of stamens as pistils and by the absence of staminodia.

HYDRANGEA

(hī-drăn′jē̇-ȧ)

HYDRANGEA—N.F.

Synonym: Seven-barks.

Source: Hydrangea arborescens Linné (Fam. Saxifragaceæ).

Etymology: Hydrangea from the Lat. "hydra," *water*, and the Gr. "aggeion," *a vessel* or *capsule*.

Arborescens from the Lat. "arbor," *tree*, i.e., tree-like or resembling a tree.

Saxifragaceæ from the Lat. "saxifragus," stone-breaking, from "saxum," *rock*, and "frangere," *to break*, referring to its use in uric acid gravel in which it was supposed to break up (dissolve) the concretions.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Hydrangea:* Rhizome cylindrical, usually cut into pieces from 3 to 10 cm. long and from 3 to 20 mm. in diameter; externally light brown to yellowish brown with a pinkish tinge, longitudinally wrinkled, the upper portion marked by few elliptical lenticels and occasional prominent buds, short branches or stem scars; from the lower surface arise a few coarse fibrous roots; fracture tough, splintery, internally yellowish white or light brown, bark thin, easily separable from the distinctly radiate wood which surrounds a prominent whitish pith. Roots attaining a length of 25 cm. and a thickness of 2 mm., irregularly bent and branching, otherwise resembling the rhizome with the exception of the pith being absent. Inodorous; taste sweetish, becoming slightly acrid.

Habitat: Eastern United States.

Discussion: This is a small shrub growing in stony ground near the banks of streams. The fact that the stem sheds its bark in successive layers or scales explains its common name of "Seven-barks." The flowers occur in clusters at the ends of the stems. These clusters often have a marginal border of large white flowers, while those within the circle are small and of a greenish color. The fruit is a 2-celled capsule containing a number of seeds. The roots are of a pale-yellowish or brownish-white color.

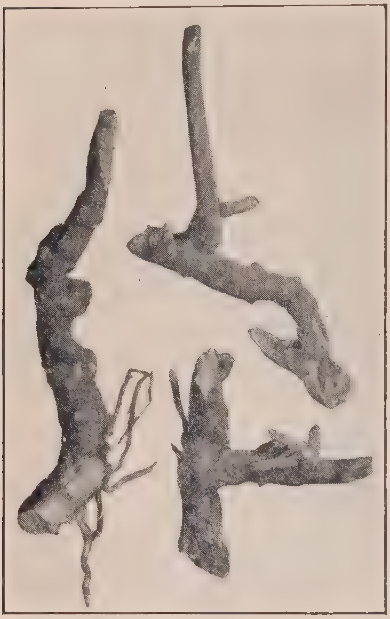


Fig. 73.—Hydrangea. ⅓ size.

Constituents: Volatile oil; resin; hydrangin, a glucoside, 1 per cent.

Properties and Uses: Hydrangea has been used as a diuretic and was long thought to possess the power of dissolving renal calculi. It is used very little.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Elixir of Hydrangea and Lithium, 1 fl. dr. (4 cc.).
Fluidextract of Hydrangea, 30 m. (2 cc.).

CHAPTER LIX

LEGUMINOSÆ

(lē̇-gū′mĭ-nō′sē)

PULSE FAMILY

This is said to be the second largest family of the plant kingdom and numbers about 8000 species. They present a great variety of forms from creeping, annual herbs to some of the tallest of trees. They are widely distributed over the earth, but are most numerous in tropical and subtropical countries. They have alternate, stipulate, usually compound leaves and regular flowers. The fruit is a dehiscent pod, as in the pea and bean. Each seed contains two cotyledons.

GLYCYRRHIZA

(glĭs′ĭ-rī′zȧ)

GLYCYRRHIZA—U.S.P.

Synonyms: Liquorice; Licorice Root; Sweetroot; Sweetwood.

Source: Glycyrrhiza glabra Linné, var. typica Regal and Herder, known in commerce as "*Spanish Licorice*," or Glycyrrhiza glabra Linné var. glandulifera Regel and Herder, known in commerce as "*Russian Licorice*," or other varieties of Glycyrrhiza glabra Linné (Fam. Leguminosæ) yielding a yellow and sweet wood.

Etymology: Glycyrrhiza from the Gr. "glykos," *sweet*, and "riza," *root*, i.e., sweetroot, referring to the taste.

Glabra from the Lat. "glaber," *smooth*, i.e., hairless, referring to the leaves, which are devoid of hairs.

Licorice and Liquorice from "liquiritia," a corrupted form of glycyrrhiza.

Glandulifera from the Lat. "glandula," *gland*, and "ferre," *to bear*, i.e., gland-bearing, referring to the glands borne on various parts of the plant.

Typica from the Lat. "typicus," *typical*, i.e., exhibiting the characteristics of a group.

Part Used: The dried rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Spanish Licorice:* Nearly cylindrical, the upper portion more or less knotty; usually in pieces from 14 to 20 cm. or more in length and from 5 to 20 mm. in thickness; externally yellowish-brown or dark brown, longitudinally wrinkled, the thinner rhizomes often having prominent alternate buds, the thicker rhizomes having distinct corky patches; fracture coarsely fibrous; internally yellow, radiate; odor distinctive; taste sweetish and slightly acrid.

Unground Russian Licorice: Nearly cylindrical, somewhat tapering, sometimes split longitudinally, from 15 to 30 cm. in length and from 1 to 5 cm. in diameter; when deprived of the outer corky layer, it is externally pale yellow; fracture coarsely fibrous; internally pale yellow; wood radially cleft; odor distinct; taste sweetish.

HABITAT: Southeastern Europe, Asia (Syria, Persia), Northern Africa. Cultivated in Spain, Russia, Germany, England, France, China and, on an experimental scale, in the United States.

DISCUSSION: This is a perennial, herbaceous plant with several stems arising from the crown of the rhizome and attaining the height of 4 or 5 feet. These stems are but slightly branched. The leaves are compound, consisting of several pairs of leaflets with a single one at the end. The flowers, which are purple or violet in color, resemble those of the garden pea and are arranged in axillary spikes borne on long peduncles. The fruit is a smooth compressed pod containing several small, bean-shaped seeds. In the variety, glandulifera, the stem, leaf and pods are more or less glandular.

Below the crown is a principal root which branches and penetrates the soil to a depth of several feet. There are also several horizontal runners which constitute the greater portion of the Spanish licorice. These runners produce buds from which new plants arise the following season. Spain produced nearly all of the licorice root (G. glabra) used up to 1870. Since then the demand has increased so rapidly that Spain has been unable to supply it, with the result that other countries have taken up the cultivation of licorice in even larger quantities than Spain. For a number of years Arabia, Turkey, Southern Russia and Asia Minor have been the chief sources of supply. In our own country California and Oregon possess millions of acres of soil that is well adapted to the raising of licorice, but the high cost of labor precludes any possibility of our becoming a competitor in the production of this drug. In 1925, 77,827,007 pounds of licorice root and 1,689,046 pounds of licorice extract were imported.

CONSTITUENTS: Glycyrrhizin, $C_{44}H_{64}O_{19}$, is the principal constituent. It exists in combination with ammonia. This compound is sweet and gives to the root its characteristic taste. Glycyramarin, a bitter principle, asparagin, several sugars and some coloring matter are also present.

Properties and Uses: The preparations of licorice are demulcent and laxative, and probably slightly expectorant. When chewed, it stimulates the flow of saliva and the secretion of mucus. These secretions are sedative and demulcent to the membranes of the mouth and throat. The demulcent action also seems to be noticeable on the bowel and urinary passages. Licorice and its preparations are widely employed to mask the taste of certain drugs as aloes, ammonium chloride, quinine, etc. The powder and the powdered extract are employed as excipients and driers for pills and troches. Although large amounts of licorice are used in pharmaceutical products, by far the greatest quantity, in the form of the extract, is used in the manufacture of chewing tobacco and confectionery. It is said to be an ingredient of some fire-extinguisher compounds.

Dose: 30 gr. (2 Gm.).

Official Preparations: U.S.P. X.

Extract of Glycyrrhiza.
Pure Extract of Glycyrrhiza.
Fluidextract of Glycyrrhiza, 30 m. (2 cc.).
Mass of Mercury, 5 gr. (0.3 Gm.).
Compound Powder of Glycyrrhiza, 1 dr. (4 Gm.).
Troches of Ammonium Chloride (Extract).

KRAMERIA

(krȧ-mē′rĭ-ȧ)

KRAMERIA—U.S.P.

Synonym: Rhatany.

Source: Krameria triandra Ruiz et Pavon, known in commerce as Peruvian Rhatany, or Krameria argentea Martius, known in commerce as Para or Brazilian Rhatany (Fam. Leguminosæ).

Etymology: Krameria was named in honor of the German botanists, J. G. H. and W. H. Kramer.

Triandra from the Gr. "tri," *three*, and "aner," *man*, i.e., having three stamens (the male organs of the flower).

Argentea from the Lat. "argentum," *silver*, from the Gr. "arges," *white* or *bright*, referring to the appearance of the leaves and young branches.

Rhatany from the Peruvian "rataña," the name of the plant.

Part Used: The dried root.

Description and Physical Properties: *Unground Peruvian Rhatany:* Crown knotty, several- to many-headed, with numerous branching roots; the latter up to

50 cm. in length and usually less than 1 cm. in thickness, cylindrical or somewhat tapering, flexuous or wavy, externally light reddish-brown or brownish-red, more or less marked with darker scaly cork especially in the upper portion, somewhat longitudinally wrinkled but devoid of transverse fissures; fracture of bark slightly fibrous, of wood tough and splintery; the bark pinkish-brown internally and less than one-third of the radius, the wood yellowish or pinkish-white and finely radiate; inodorous; bark astringent, wood nearly tasteless.

HABITAT: Peru, Brazil.

DISCUSSION: Krameria triandra is a procumbent shrub. The dark-colored stem is divided into numerous branches. The leaves are oblong, pointed and entire. Both surfaces of the leaves, as well as the younger branches, are covered with soft, silky hairs, giving them a whitish, shiny appearance. The bright-scarlet flowers stand on short peduncles arising from the axils of the upper leaves. This species is found in dry, sandy places in the Peruvian Andes, where it blooms throughout the year. Krameria argentea is very similar in appearance, but is found for the most part in Brazil.

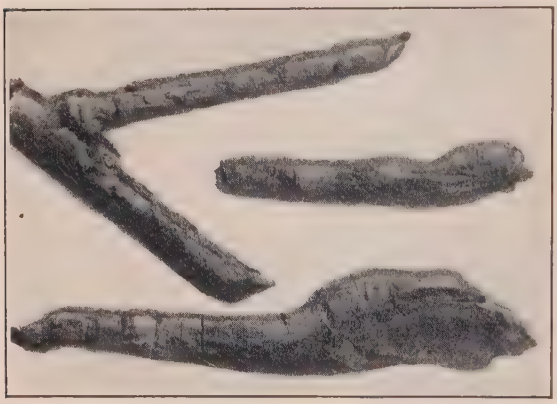


FIG. 74.—Krameria.

CONSTITUENTS: Tannic acid, 8 to 9 per cent; kramerio-tannic acid; gum; starch.

PROPERTIES AND USES: Because of its astringent properties, krameria is given in chronic diarrhea. It has also been employed locally in anal fissure, leucorrhœa and prolapsus ani.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Tincture of Krameria, 1 fl. dr. (4 cc.).

PHYSOSTIGMA

(fī′sŏ-stĭg′mȧ)

PHYSOSTIGMA—U.S.P. IX

SYNONYMS: Calabar Bean; Ordeal Bean; Chop-nut.

SOURCE: Physostigma venenosum Balfour (Fam. Leguminosæ).

ETYMOLOGY: Physostigma from the Gr. "physa," *a bladder*, and "stigma," *that part of the pistil of a flower which receives the pollen grains*, i.e., the stigmatic appendage is hollow and inflated.

Venenosum from the Lat. "venenosus," *poisonous*, referring to its physiological action.

Calabar is the name of the district in Western Africa from which the drug is obtained.

PART USED: The dried, ripe seeds containing not less than 0.15 per cent of the alkaloids of physostigma.

DESCRIPTIONS AND PHYSICAL PROPERTIES: Oblong or ellipsoidal, somewhat compressed reniform, from 15 to 30 mm. in length and from 10 to 15 mm. in thickness; externally reddish or chocolate brown, smooth, somewhat wrinkled near the brownish-black groove, the latter being about 2 mm. in width and extending almost the entire length of the convex edge and in which are found frequently the remains of the white membranous funiculus, the margins of the seed-coat on both sides of the groove somewhat elevated, of a yellowish-red or brownish-red color and somewhat thickened; embryos large, white, with short hypocotyl and two concavo-convex cotyledons; taste at first starchy, afterwards acrid.

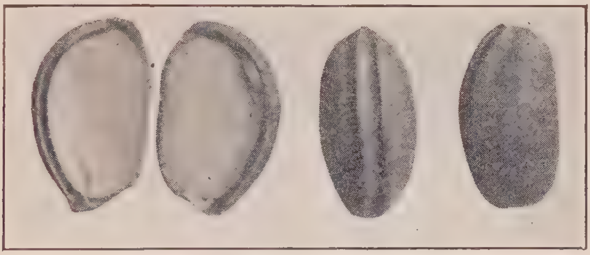


FIG. 75.—Physostigma. The seed to the left has been split open.

HABITAT: Western Africa in the valleys of the Calabar and Niger Rivers. Cultivated in India and Brazil.

DISCUSSION: This plant is one of the numerous woody climbers of the tropical forests of Africa. It is especially abundant along the banks of streams, climbing upon trees to the height of 50 or more feet. The root is much branched and has many fibrils to which small, succulent tubers are often attached. The leaves are large, resembling in every way, those of the Lima bean. The purple flowers hang in graceful, pendulous racemes. The fruit is a thick leathery pod containing two or more seeds. The pods ripen in all seasons of the year, but more abundantly during the rainy season which lasts from June till September.

Explorers in the "Dark Continent" found the Calabar bean in use by the natives, as an ordeal, to determine the guilt or innocence of persons accused of crime. According to the custom, the chief of the tribe would administer a portion of the ordeal bean to the accused and, from the results obtained, determine whether he was guilty or innocent. It is said that if the bean caused emesis, so that the accused was uninjured by it, he was declared innocent of the charge and set free. If it caused purgation, without fatal results, he was declared guilty and sold into slavery. It quite frequently happened, however, that death resulted, and this was considered sufficient evidence of guilt. It is said that the integuments of the fresh seeds, as well as their shells, contain an emetic principle, so that the chief of the tribe, by regulating the relative amounts given to the accused, could temper justice to suit his own ideas and purposes.

Constituents: Physostigmine (eserine), $C_{15}H_{21}N_3O_2$; isophysostigmine; eseramine, $C_{15}H_{25}N_4O_3$; calabarine; eseridine, $C_{15}H_{23}N_3O_3$; geneserine.

Properties and Uses: Physostigma as well as its principal alkaloid, physostigmine, has been used in cases of atonic conditions of the intestines and bladder and in catarrhal conditions of the former. However, it has gradually fallen into disuse as far as its internal administration is concerned and at present its application is largely confined to the lessening of intraocular tension in glaucoma and to hasten the contraction of the pupil after the use of atropine. For this purpose physostigmine, generally in the form of the salicylate or sulphate, is used in $\frac{1}{3}$ to 1 per cent solution, two to four drops at a time being applied to the eye.

Dose: $1\frac{1}{2}$ gr. (0.1 Gm.).

TRAGACANTHA

(trăg′ȧ-kănth′ȧ)

TRAGACANTH—U.S.P.

Synonyms: Gum Tragacanth; Goat's-thorn; Hog Gum.

Source: Astragalus gummifer Labillardière, or other Asiatic species of Astragalus (Fam. Leguminosæ).

Etymology: Tragacantha from the Gr. "tragos," *goat*, and "akantha," *horn*, because the exuded gum acquires a horny consistency and appearance.

Astragalus from the Gr. "astragalos," *the ankle bone*, referring to the bony or horny appearance of the gum.

Gummifer from the Lat. "gummi," *gum*, and "ferre," *to bear*, i.e., gum-bearing.

Part Used: The dried, gummy exudation.

Description and Physical Properties: *Unground Tragacanth:* In flattened, lamellated, frequently curved fragments or in straight or spirally twisted linear pieces from 0.5 to 2.5 mm. in thickness; whitish to light brown, translucent and horny; fracture short; rendered more easily pulverizable by heating to 50° C.; inodorous; taste insipid, mucilaginous.

Habitat: Asia Minor, Western Asia.

Discussion: Tragacanth is not a normal constituent of the aforenamed plant, but a product of metamorphosis of the cell walls of the pith and medullary rays. This change, i.e., the metamorphosis, begins in the center of the pith and progresses outward, the thin walls gradually becoming thicker and thicker until a homogenous, jelly-like mucilage results. This formation of the mucilage develops considerable pressure within the branch, resulting in longitudinal cracks or splits from which the mucilage slowly exudes. For some unknown reason this exudation takes place only at night. By making artificial incisions in the stem and older branches, the yield is greatly increased.

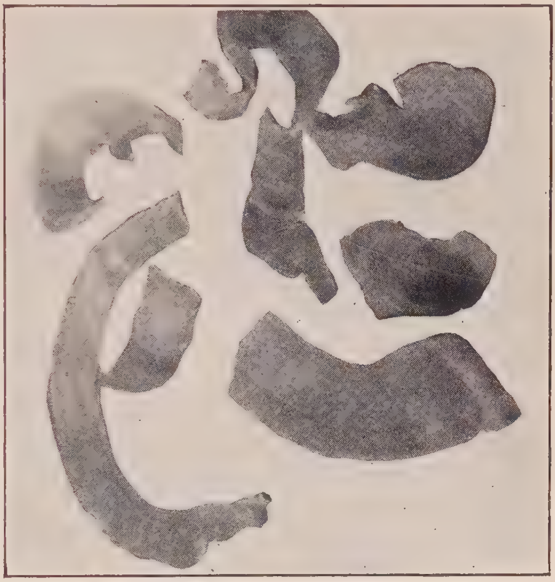


Fig. 76.—Tragacanth.

The shape which the exuding gum assumes is dependent upon the form of the opening through which it escapes. The gum which exudes spontaneously is usually in irregular tears or worm-like granules and is of a brownish or yellowish color. If a branch of the tree be broken off, there immediately wells out from the pith a stream of soft mucilage, like a worm. That which exudes from artificial incisions is in the form of thin, flat, bands or ribbons. As it dries it becomes horn-like in appearance and consistency, being marked by parallel lines or ridges running across the ribbon, showing the amount which exudes each night.

Tragacanth enters commerce through the ports of Smyrna, Constantinople and Bagdad.

Tragacanth was not known to the Greeks until the fourth or fifth century. At that time it was used as now for cough, hoarseness, etc., similar to acacia. Its superior adhesiveness over the latter renders it a better protective for excoriated surfaces, ulcers, burns, etc. During 1925, 966,498 pounds of tragacanth were imported.

Constituents: Cellulose (insoluble in boiling water, cold dilute acids or alkalies); soluble gum (not identical with the arabin of acacia, although similar to it in some respects); bassorin.

Properties and Uses: Tragacanth is used for its demulcent effect in coughs and hoarseness. Externally it is employed as a protective for burns, scalds and excoriated surfaces. It is employed in cosmetics and in pharmaceuticals as an emulsifying agent to suspend oils and resins in aqueous solution, and as an adhesive excipient in the manufacture of pills, tablets, lozenges, troches, etc.

Official Preparations: U.S.P. X.
- Mucilage of Tragacanth.
- Pills of Ferrous Carbonate, 2 pills.
- Troches of Tannic Acid.
- Troches of Ammonium Chloride.

BALSAMUM PERUVIANUM

(bôl-sȧm′ŭm pē̇-ro͞o′vĭ-ăn′-ŭm)

BALSAM OF PERU—U.S.P.

Synonyms: Peru Balsam; Black Balsam; Indian Balsam; China Oil.

Source: Toluifera Pereiræ (Royle) Baillon (Fam. Leguminosæ).

Etymology: Toluifera from "tolu," the native name of balsam of tolu, given in honor of "Tolu" (now Santiago de Tolu), a seaport of Colombia on the Caribbean Sea, and the Lat. "ferre," *to bear*, i.e., tolu-bearing.

Pereiræ, in honor of Jonathan Pereira (1804–1853), the author of Elements of Materia Medica and Professor to the British Pharmaceutical Society, who visited South America to study these and other plants.

Peruvianum, the Lat. form signifying *of* or *pertaining to Peru.*

Description and Physical Properties: A dark-brown, viscid liquid, transparent, and appearing reddish-brown in thin layers. It has an agreeable, vanilla-like odor, and a bitter, acrid taste, with a persistent after-taste, and is free from stringiness or stickiness. It does not harden on exposure to air.

The Balsam is nearly insoluble in water, but is soluble in alcohol, chloroform, and glacial acetic acid, with not more than an opalescence. It is only partly soluble in ether and in petroleum benzin.

HABITAT: Central America, principally Salvador.

DISCUSSION: The tree producing this balsam is tall and straight, with smooth, ash-colored bark and a large, spreading top. The leaves, which are alternate and petiolate, have from 5 to 11 leaflets, each about 3 inches in length by nearly an inch in breadth. The fruit is a pod from 2 to 4 inches in length and containing a number of yellowish-white beans. The wood resembles mahogany and possesses considerable value. The trees are most abundant in the Republic of Salvador, especially along the coast.

The tree begins to furnish balsam when about five years old and continues productive for thirty or more years. The balsam is collected by the natives in a small district known as the "*Balsam Coast.*" Early in November or December they beat the bark with mauls or clubs on four sides of the tree in order to cause it to separate from the trunk, the intermediate strips being left sound so as not to kill the tree. The bruised bark shows a tendency to split, and when this does not occur, long incisions are made in it. After a few days the injured surface is scorched with fire and if the bark does not cleave loose within another week, it is stripped off by hand. At this period of the process the balsam begins to exude quite freely from the exposed wood. The trees are now wrapped with all manner of old rags to absorb the exuding balsam. When these rags become saturated, they are removed and boiled in water in order to separate the balsam which then settles to the bottom. The water, when cold, is poured off and the balsam transferred to gourds or bladders. After about another week the trees begin to exude more balsam which is collected as before. Usually a third collection is also made by again wounding the exposed surface of the tree and proceeding as previously stated.

The natives sell the balsam to dealers who further purify it by allowing it to stand for some time and then straining. It is then put into jars or metallic receptacles for exportation. The average yield per tree is said to be about two pounds, and it requires two or three years for the tree to renew its bark. The balsam is a pathological product that owes its qualities to neither the wood nor the bark, since it does not preëxist, but solely to the stimulation caused by the wounding of the tree. During 1924, 51,924 pounds of balsam of Peru were imported.

CONSTITUENTS: This balsam contains about 60 per cent of cinnamyl benzoate, frequently called cinnamein and described as a volatile oil;

8 to 10 per cent of cinnamic acid; 30 per cent of resin and small amounts of benzyl benzoate, vanillin, styrol, styracin and benzyl alcohol.

Properties and Uses: Balsam of Peru is a stimulating expectorant, protective and antiseptic of no mean value. It is eliminated in part by the bronchial mucous membrane which it stimulates and on which it exerts an antiseptic effect during its passage. Thus it is used in coughs, colds, asthma, bronchitis and various pulmonary conditions. The greater portion of the drug, however, is eliminated by the kidneys whose secretion thereby is rendered somewhat antiseptic. Externally, balsam of Peru is employed in the form of salves and ointments for ringworm, scabies, eczema and a number of cutaneous affections.

TOLU

(tō̇-lo͞o)

TOLU—U.S.P.

Synonyms: Balsam of Tolu; Tolu Balsam; Resin of Tolu.

Source: Toluifera Balsamum Linné (Fam. Leguminosæ).

Etymology: Toluifera, from "tolu," the native name of the product, given in honor of "Tolu" (now Santiago de Tolu), a seaport of Colombia on the Caribbean Sea, and the Lat. "ferre," *to bear*, i.e., tolu-bearing.

Balsamum from the Gr. "balsamon," the secretion of the balsam tree.

Part Used: The balsam obtained from the tree.

Description and Physical Properties: A brown or yellowish-brown, plastic solid, transparent in thin layers and brittle when old, dried, or exposed to cold. It has a pleasant, aromatic odor resembling that of vanilla, and a mild, aromatic taste.

Tolu is nearly insoluble in water and in petroleum benzin. It is soluble in alcohol, chloroform, and ether. It dissolves in solutions of the fixed alkalies, usually leaving an insoluble residue.

Habitat: Venezuela, Colombia, Peru.

Discussion: The tree furnishing this product grows about 75 or 80 feet in height and has a round spreading top. The bark is smooth and of a yellowish-brown color with white lenticels. While the greater portion of this product is of a pathological formation, some is said to be secreted normally in the young growing tissues of the tree, such as the leaves and twigs. It is found in the older tissues only as the result of injuries.

The natives cut large V-shaped incisions through the bark and collect the juice by attaching gourds to the tree below the apex of the incisions. Oftentimes several incisions are made in a tree and as many gourds suspended by various means. The collector goes from tree to tree, carrying a bag made from the skin of some animal. Into this he empties the contents of the gourds. It is then taken to the various shipping points and transferred to tin vessels for commerce. During the year 1924, 45,026 pounds of tolu were imported.

Constituents: Resin, 75 to 80 per cent; free cinnamic and benzoic acids, 12 to 15 per cent; volatile oil, 1 per cent; vanillin ½ per cent; benzylic esters of cinnamic and benzoic acids, 7.5 per cent.

Properties and Uses: The properties and uses of balsam of Tolu are practically identical with those of the balsam of Peru, which see.

Official Preparations: U.S.P. X.

Tincture of Tolu, 30 m. (2 cc.).
Syrup of Tolu (from tincture), 2½ fl. dr. (10 cc.).
Compound Tincture of Benzoin, 30 m. (2 cc.).

KINO

(kī'nō)

KINO—U.S.P.

Synonyms: Indian Kino; Malabar Kino; Vengay; Bastard Teak.

Source: Pterocarpus Marsupium Roxburgh (Fam. Leguminosæ).

Etymology: Pterocarpus from the Gr. "pteron," *wing* or *feather*, and "karpos," *a fruit*, referring to the peculiar covering of the fruit.

Marsupium from the Lat. "marsupium," *a bag* or *pouch*, referring to the pockets in the bark in which the sap collects.

Kino is the name given to this product by the Mandingos, a tribe of West African negroes.

Part Used: The dried juice obtained from the trunk and yielding not less than 45 per cent of alcohol-soluble extractive and not less than 80 per cent of water-soluble extractive.

Description and Physical Properties: *Unground Kino:* Small, brittle, angular fragments, usually less than 10 mm. in diameter, varying in color from dark reddish-brown to reddish-black; inodorous; taste very astringent; upon mastication coloring the saliva pink.

Habitat: Western Africa, India (Malabar and Bengal), Ceylon.

Discussion: The tree yielding this product is of very large size and is found growing on the foot-hills of the southern Himalayas through India to Ceylon, but particularly on the Malabar Coast. The wood of the trunk is prized for its fine timber. The privilege of collecting kino is let by the Government of India to the highest bidders. It is collected to some extent throughout the year, but principally during the dry season (February and March), when it is of a better quality and is more easily dried.

The natives cut a long incision through the bark to the cambium zone, with lateral feeders running into this main incision. The juice, resembling thickened current juice, exudes freely, flowing into clay cups, bamboo joints or other vessels placed at the lower end of the main incision. The juice is first dried in the sun, to the consistency of a thick extract, then it is poured into shallow pans where it is allowed to dry until it becomes crumbly, when it is packed into wooden boxes for shipment. The flow is greatest at night. When the trees are small they are sometimes killed by excessive bleeding. This may be averted by allowing them to rest alternate seasons.

CONSTITUENTS: Kino consists chiefly of a modification of tannic acid known as "*kino-tannic acid*," 40 to 80 per cent being present. It also contains a red coloring matter called "*kino red*." Kinoin, pyrocatechin ($C_{14}H_{12}OH_6$) and gum are also present.

DOSE: 8 gr. (0.5 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Tincture of Kino, 1 fl. dr. (4 cc.).

SANTALUM RUBRUM

(săn-tăl′ŭm roo͞′brŭm)

RED SAUNDERS—U.S.P.

SYNONYMS: Red Santalwood; Red Sandalwood; Ruby Wood.

SOURCE: Pterocarpus santalinus Linné filius (Fam. Leguminosæ).

ETYMOLOGY: Santalum from the Arabic "ssandal," the name of the wood. The Malayese name of the wood is "tsjendan." It is probable that these names are derived from the Persian "sandul," meaning "*useful*."

Pterocarpus from the Gr. "pteron," *wing* or *feather*, and "karpos," *fruit*, i.e., its winged fruit-pods or legumes are girdled with a broad crisped wing-like appendage.

PART USED: The heart-wood.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Red Saunders:* Usually in the form of a coarse powder, of a purplish to brownish-red color and nearly odorless and tasteless.

HABITAT: India, Ceylon, Philippine Islands.

DISCUSSION: This is a large tree with compound, tri-foliate leaves and yellow flowers occurring in axillary spikes. The wood is very valuable and its use in India is controlled with the strictest supervision by government forest inspectors. New forests are established from time to time to prevent extermination. The heartwood, which is hard and heavy and of a dark-reddish color, is highly valued by the natives for building material and cabinet work. The light-colored sapwood is removed and only the heartwood employed. The wood reaches New York in the form of billets or blocks, usually from 3 to 5 feet in length.

Constituents: A number of constituents are reported, but santalin (santalic acid), the red coloring matter, is the only one of any special importance.

Properties and Uses: Red saunders has no special medicinal value. It is employed mainly in the arts for coloring cotton, silk and woolen goods, several shades of red being obtained, depending upon the mordant used. It is employed pharmaceutically for coloring various preparations.

SCOPARIUS

(skō-păr'ĭ-ŭs)

SCOPARIUS—N.F.

Synonyms: Broom; Scotch Broom; Bannal.

Source: Cytisus scoparius (Linné), Link (Fam. Leguminosæ).

Etymology: Cytisus from the Gr. "kytisos," the classical name of the plant, given in honor of the Island Cythrus, one of the Cyclades group, where it was first discovered.

Scoparius from the Lat. "scopa," *a broom*, referring to the tops which resemble the brush of a broom.

Bannal, the name of the broom plant, from the Celtic name for corn, referring to the similarity of the plants.

Part Used: The dried tops.

Description and Physical Properties: *Unground Scoparius:* Stems thin, flexible, with branched twigs, from 1 to 3 mm. in thickness, more or less angled and winged; externally dark green, nearly glabrous, with numerous reddish-brown cork patches; internally yellowish; fracture short-fibrous, that of thicker pieces tough and splintery; leaves present in small amount or absent, upper leaves sessile, with often only one obovate leaflet. Odor slight, on bruising more distinct and peculiar; taste disagreeable, bitter.

Habitat: Western Asia, Southern Europe. Naturalized in the Eastern United States.

Discussion: This plant is a shrub, sometimes reaching 8 feet in height. The flowers, which are solitary upon short axillary peduncles, are large and showy and of a golden-yellow color. The fruit is a compressed legume containing a number of seeds which are said to contain the same constituents as the tops.

Constituents: Sparteine, $C_{15}H_{26}N_2$, a colorless liquid alkaloid of a very bitter taste. It turns brown upon exposure and has a faintly aniline-like odor. It is the cardiac stimulant and narcotic principle. Scoparin, the glucoside present, is diuretic and may be recovered from the concentrated decoction which gelatinizes on standing. This jelly-like substance is expressed, purified by repeated solution in hot water and finally in hot alcohol.

Properties and Uses: Scoparius is classified as a cardiac tonic and diuretic, similar to digitalis, but is considered quite useless by many practitioners. It is said to slow the rate, but strengthen the beat of the heart. It is employed in functional and valvular cardiac conditions, Graves' disease, asthma, dropsies and chronic Bright's disease.

Dose: 15 gr. (1 Gm.).

Official Preparation: N.F. V.

Fluidextract of Scoparius, 15 m. (1 cc.).

HÆMATOXYLON

(hē′mȧ-tŏx′lŏn)

HÆMATOXYLON—N.F.

Synonyms: Logwood; Jamaica Logwood; Honduras Logwood; Santo Domingo Logwood; Campechy Wood; Black Wood.

Source: Hæmatoxylon campechianum Linné (Fam. Leguminosæ).

Etymology: Hæmatoxylon from the Gr. "haima," *blood*, and "xylon," *wood*, referring to the color of the heartwood.

Campechianum refers to its habitat, i.e., the states of Mexico bordering on the Gulf of Campeche.

Logwood, from the fact that it is imported in the form of logs or billets.

Part Used: The heartwood.

Description and Physical Properties: *Unground Hematoxylon:* Usually in small chips, occasionally in billets, reddish brown, the freshly cut surface dark yellowish red. Odor faint, agreeable; taste sweetish, astringent.

Habitat: Mexico, Central America. Naturalized in the West Indies, especially Jamaica and Santo Domingo.

Discussion: This is a small tree growing from 20 to 40 feet in height and from 12 to 15 inches in diameter. The trunk is covered with a thick, rough bark and is hard, knotty, tough and very crooked.

The sapwood is yellowish in color, while the heartwood is a deep-red. The leaves are compound. The flowers have a brownish-purple calyx and lemon-yellow petals. They occur in axillary spikes or racemes near the ends of the branches.

Logwood grows abundantly on the shores of the Gulf of Campeche. The trees are cut when about ten years old, deprived of the bark and sapwood, leaving the heartwood to be cut into logs for the market. There are four commercial varieties of logwood, known, in the order of their value, as "*Campechy*," "*Honduras*," *Santo Domingo*," and "*Jamaica Logwood*." In 1925, 22,788 tons of logwood were imported.

Constituents: Hematoxylin, $C_{16}H_{14}O_6+3H_2O$, tannin, resin, volatile oil. The hematoxylin occurs in colorless or yellowish-white, prismatic crystals and has a taste reminding one of that of licorice root.

Properties and Uses: On account of the tannic acid present, logwood is astringent and is employed in chronic diarrhea, dysentery and cholera infantum. It is also employed in the form of a douche for leucorrhœa. It is used as an astringent and antiseptic in indolent ulcers and sores.

On the addition of alkalies, in the presence of air, logwood turns to a violet-blue, then purplish-red, and finally brown, and constitutes one of the most important of our vegetable dyes for coloring blue, brown, violet and black, giving the latter a rich luster and velvety appearance. By far the greater part of it is used for dyeing.

Dose: 30 gr. (2 Gm.).

Official Preparation: N.F. V.

Extract of Hematoxylon, 15 gr. (1 Gm.).

CASSIA FISTULA

(kăsh′ȧ fĭs′tū̇-lȧ)

CASSIA FISTULA—N.F.

Synonyms: Purging Cassia; Golden Shower; Drumstick Tree; Puddingstick Tree.

Source: Cathartocarpus Fistula (Linné) Persoon (Fam. Leguminosæ).

Etymology: Cassia from the Gr. "kasia," from the Hebrew "qetsi′ah," *to cut off* or *peel off*, from "qatsa′," *to cut*. The genus derives its name from the fact that the bark of some of its species was peeled off and used.

Fistula from the Lat. "fistula," *a tube, pipe* or *cane*, referring to the shape of the pods.

Cathartocarpus from the Gr. "cathartikos," *cathartic*, from "katharein," to cleanse, from "katharos," pure, and "karpos," *fruit*, i.e., a fruit having a cathartic property or action.

Part Used: The dried fruit.

Description and Physical Properties: Unground Cassia Fistula: Cylindrical, from 25 to 50 cm. long, about 20 mm. in diameter, smooth, chestnut-brown in color, on one side a longitudinal groove and on the other a smooth line or slight ridge, indicating the sutures; indehiscent; the cavity divided transversely into numerous compartments, each containing a reddish-brown, glossy, flattish oval seed embedded in a blackish-brown, sweet pulp. Odor resembling that of prunes.

Habitat: Upper Egypt, East Indies, West Indies, Brazil.

Discussion: This is a medium sized tree of heavy, hard wood, growing from 40 to 50 feet in height. It has large spreading branches and is covered with a smooth, ash-colored bark. The leaves are compound, being composed of five or six pairs of opposite leaflets. The flowers, which are arranged in long, pendant, axillary racemes, are large and of a golden-yellow color. The fruit is a woody, cylindrical pod from 12 to 20 inches in length, divided internally into many compartments, each containing a seed surrounded by dark-colored pulp. These pods hang in clusters and when blown by the wind produce a noise that may be heard for some distance. 7,586,049 pounds of cassia fistula were imported in 1924.

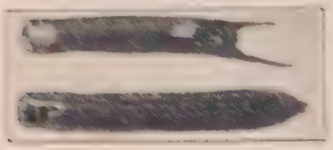


Fig. 77.—Cassia Fistula.

Constituents: The pulp of the pod contains sugar, 60 per cent; butyric acid; mucilage; pectin; volatile oil, a trace. The pulp is the medicinal portion and should constitute about 30 per cent of the weight of the pod. It is extracted by boiling with water and concentrating. When fresh it may be scraped out of the pod with a knife or spatula.

Properties and Uses: The name "purging cassia" suggests that this drug is a purgative. In fact it is but a mild laxative and is generally combined with more active agents.

Dose: 60 gr. (4 Gm.).

Official Preparation: N.F. V.

Confection of Senna, 60 gr. (4 Gm.).

SENNA

(sĕn'ă)

SENNA—U.S.P.

Synonyms: Senna Leaves; Alexandria Senna; Indian Senna; Tinnevelly Senna; Nubian Senna; Tripoli Senna.

Source: Cassia Senna Linné, known in commerce as "Alexandria Senna," or Cassia angustifolia Vahl, known in commerce as "Tinnevelly Senna" (Fam. Leguminosæ).

Etymology: Senna from the Arabic "sena," the name of the drug.

Cassia from the Gr. "kasia'," from the Hebrew "qetsi'ah," *to cut off* or *peel off*, from "qatsa'," *to cut*. The genus derived its name from the fact that the bark of some of its species was peeled off and used.

Angustifolia from the Lat. "angustus," narrow, and "folium," leaf, i.e., narrow-leaved.

Part Used: The dried leaflets.

Description and Physical Properties: *Unground Alexandria Senna:* Inequilaterally lanceolate or lance-ovate, frequently broken; from 2 to 3.5 cm. in length and from 6 to 10 mm. in width, unequal at the base, with very short, stout petiolules; acutely cuspidate, entire, brittle, subcoriaceous; hairs short and somewhat appressed, few on the upper surface, more numerous on the lower surface, where they occur spreading on the midrib, especially on the lower part; color light-grayish-green; odor characteristic; taste mucilaginous, slightly bitter.

Unground Tinnevelly Senna: Usually unbroken, from 2 to 5 cm. in length, from 6 to 15 mm. in width; broadly acute at the apex, slightly hairy; light yellowish-green and otherwise resembling Alexandria Senna.

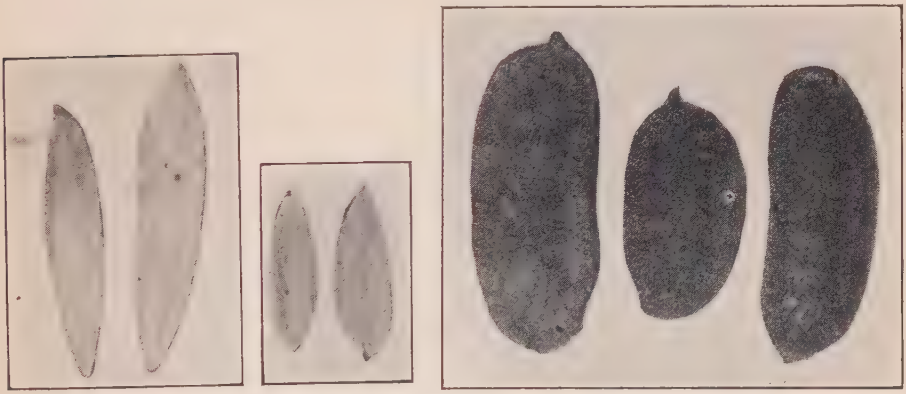


Fig. 78.—Left, Tinnevelly; middle, Alexandria, Senna. Senna pods are shown in the group at the right.

Habitat: Nubia, Barbary, Abyssinia, Egypt, India.

Discussion: The shrub which yields Alexandria Senna is from 2 to 10 feet high and grows wild in the region of the Egyptian Soudan as well as in other parts of Africa and in Hejaz, Arabia. The same plant, introduced into India is cultivated there commercially for its leaves.

The leaves of the Alexandria variety of senna are pinnate, the leaflets sessile, in pairs, and from ½ to 1 inch in length.

Two crops of Alexandria senna are harvested each year, one in the spring and the other in the fall. The plants are then cut and dried in the sun; then the leaves are stripped off and packed in crude bales in which several species of senna are usually present. The Alexandria senna is gathered for the most part in Upper Egypt and the Soudan. In 1925, 2,984,334 pounds of senna were imported.

The Tinnevelly senna originally flourished in much the same geographical areas as the Alexandria senna, having its habitat in Africa, southern Arabia, the Soudan and northern India. While it still grows wild the Tinnevelly leaves are derived most largely from cultivated plants grown in the localities mentioned. The leaves are pinnate and consist of several pairs of opposite leaflets which are much larger than Alexandria leaves, being from about one inch to two or slightly more than two inches long. When properly gathered and prepared it constitutes the best grade of senna on the market. Both varieties produce thin, flat, brownish-black pods from one to two inches long and one-half as broad.

Cassia angustifolia is an annual, but by care it may be made to become perennial. It has an erect, smooth stem with compound leaves and bright-yellow flowers disposed in axillary or terminal racemes. The pod is about two and a half inches in length, membranous, tapering abruptly at the base and rounded at the apex.

Other commercial varieties of senna are "Arabian senna" from the same botanical source as the Tinnevelly senna, and "Mecca senna," sometimes known in trade circles as *Bombay senna,* is collected from both wild and cultivated plants of the same botanical origin as Tinnevelly senna.

CONSTITUENTS: Emodin; iso-emodin; cathartic acid; chrysophanic acid; sennacrol.

PROPERTIES AND USES: Senna is said to stimulate directly the intestinal mucous membrane for which reason it acts as a peristaltic on nearly the entire length of that tract and produces, within a few hours, copius yellow stools, accompanied, when used alone, by some colic and griping. Senna is largely employed in chronic constipation. On account of the mildness of its action, it is employed when hemorrhoids or anal fissures are complications. It may stain normal acid urine yellow and alkaline urine carmine. It is eliminated in the milk, which will act as a laxative to a nursing child.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Fluidextract of Senna, 30 m. (2 cc.).
Compound Powder of Glycyrrhiza, 1 dr. (4 Gm.).
Syrup of Senna, 2 fl. dr. (8 cc.).

COPAIBA

(kō-pā′bȧ)

COPAIBA—U.S.P.

SYNONYMS: Copaiva; Balsam of Copaiba; Jesuit's Balsam.

SOURCE: This drug is collected from several South American species of Copaiba, the botanical classification of which has not yet been determined (Fam. Leguminosæ).

ETYMOLOGY: Copaiba from the Brazilian "cupauba," the native name of the tree from which it is obtained.

PART USED: The oleoresin.

DESCRIPTION AND PHYSICAL PROPERTIES: A pale yellow to brownish-yellow, more or less viscid liquid, either without fluorescence or with only a slightly greenish fluorescence. It has a peculiar, aromatic odor, and a persistent, bitter, acrid taste.

Copaiba is insoluble in water, partly soluble in alcohol, more completely soluble in dehydrated alcohol. It is soluble in carbon disulphide and in fixed or volatile oils, completely soluble in chloroform and in ether; also soluble in an equal volume of petroleum benzin, the further addition of the solvent producing a flocculent precipitate.

HABITAT: Brazil, Venezuela, Colombia, especially in the valleys of the Amazon and Orinoco Rivers.

DISCUSSION: The various species of Copaiba which yield this so-called "*balsam*" (improperly so called as it contains neither benzoic nor cinnamic acid) are all small trees with strong, tough, durable wood and growing throughout tropical America. Collection, however, is made principally in Brazil and Venezuela. The trees are provided throughout with resin ducts of large size into which the oleoresin is secreted in such quantities that the pressure sometimes causes the trunk of the tree to burst with a loud report.

Collection is accomplished by boring holes with an auger, or cutting them with a chisel to the center of the tree. Since the oleoresin is a physiological product, the flow starts at once, often yielding 10 or 12 pints within a few hours. When the flow begins to slacken, the hole is plugged with clay for a number of days when, upon reopening, the oleoresin again flows in considerable amount. A tree will frequently yield as much as 10 or 12 gallons in a single season. The oleoresin is thin, clear and colorless at first, but soon becomes thicker and yellowish with age. It is exported in casks, demijohns, cans or jugs.

There are several commercial varieties of copaiba as follows: Maracaibo, Para or Maranham, Cayenne, Bahia, Cartagena, Surinam and African. These differ from one another and a sample of one variety may vary greatly from another sample of the same variety. In a general way the following statements apply fairly well to the several varieties.

Para copaiba generally is thinner, has a lower specific gravity, more volatile oil (55 to 90 per cent) and less resin than the other varieties. Maracaibo copaiba contains less volatile oil and correspondingly more resin for which reason it more frequently responds to the official requirements than the preceding variety. The oleoresin from Surinam is subject to considerable variation in consistence and composition while that known as African resembles the Maracaibo drug but possesses a brownish color and greenish fluoresence.

Constituents: Resin; volatile oil. The resin consists mostly of crystallizable copaibic acid, $C_{20}H_{30}O_2$, with a smaller amount of an amorphous acid resin.

Properties and Uses: Copaiba is diuretic, antiseptic and stimulant to the mucous membranes of the genito-urinary tract. It is used for these effects in the later stages of gonorrhœa, in subacute pyelitis, dropsy, dysentery, cystitis and bronchitis. A part of the volatile oil is excreted by the respiratory mucous membrane, where it stimulates the tissues with which it comes in contact during its passage. Copaiba s applied externally for psoriasis, chilblains and sore breasts.

Dose: 15 m. (1 cc.).

ACACIA

(ȧ-kā′shȧ)

ACACIA—U.S.P.

Synonyms: Gum Arabic; Gum Senegal; Gum Acacia.

Source: Acacia Senegal Willdenow, or some other species of Acacia (Fam. Leguminosæ).

Etymology: Acacia from the Gr. "akakia," the name of a thorny Egyptian tree, from "ake," *a point*, referring to the thorny nature of the tree.

Senegal from the name of a district in Western Africa where the tree grew abundantly.

Arabic is obviously a misnomer, in connection with this drug, since Arabia produces little acacia and exports none.

Part Used: The dried, gummy exudation from the stems and branches.

Description and Physical Properties: *Unground Acacia:* In spheroidal tears up to 32 mm. in diameter or in angular fragments; color, yellowish-white to light amber; translucent; very brittle, the fractured surface glassy and occasionally iridescent; almost odorless; taste, mucilaginous.

Habitat: Africa (Senegal, Kordofan, Abyssinia, Nubia, Egypt).

Discussion: There are more than 400 species of acacia, but the most as well as the best gum is collected from the Acacia Senegal. This species forms entire forests in some districts of Africa, growing in sandy or desert regions with little or no other vegetation.

The acacia tree is small, perhaps 20 feet in height. It has crooked, twisted, irregular branches which are armed at each node with three sharp hooked thorns. The flowers are small and yellow, occurring in dense spikes. The fruit is a broad pod, some 3 or 4 inches long and contains several seeds.

Several species of acacia are employed in California in park and boulevard ornamentation. Due to the peculiar shade of green and their doubly-compound leaves and the richness of their flowers, they rival the most beautiful of our ornamental trees.

Acacia is an exudation, formed from a degenerative process called "*gummosis*," and flows from the bark during the dry period immediately following the wet season. This metamorphosis of the cell contents of the cambium zone, cortex and adjacent parenchyma is favored by dry, hot seasons, and especially in unhealthy trees. It exudes as a thick juice through fissures caused by the dry winds following the rainy season. Artificial incisions also are made. Collection consists merely in separating the hardened pieces from the trees or in picking them up from the ground. By heating acacia to 30° C. it can easily be ground to an impalpable powder. The granulated acacia is more readily soluble, however, since the fine powder shows a tendency to lump and resist the action of water. In 1925, 7,256,155 pounds of acacia were imported.

Constituents: Arabic acid, $C_6H_{10}O_5+2H_2O$, also called arabin, which exists in combination with calcium, magnesium or potassium, the salts thus produced being called "*arabates*."

Properties and Uses: Acacia dissolves readily in water forming a mucilage that is demulcent and protective to mucous surfaces. It is used in this form, often as a vehicle for dissolving or suspending other drugs. Its only action is to soothe and protect the inflamed or irritated surface. It is employed externally for the same purpose on burns, scalds, ulcers and abraded or excoriated surfaces. When used externally, the action is known as "*emollient.*" Powdered and granulated acacia are extensively employed for emulsifying fixed oils in the manufacture of emulsions. The powder is used in pharmacy as an adhesive in making pills, troches, etc. Acacia is employed in the arts as a thickening agent for water-colors and for suspending the tannate of iron in the manufacture of inks. It is also employed in manufacturing as a sizing for cloths and fabrics.

Official Preparations: U.S.P. X. (Used because of its physical or mechanical properties.)

Emulsion of Cod Liver Oil, 4 fl. dr. (15 cc.).
Emulsion of Oil of Turpentine, ½ fl. dr. (2 cc.).
Pills of Phosphorus, 1 pill.
Compound Chalk Powder, 30 gr. (2 Gm.).
Mucilage of Acacia, 4 fl. dr. (15 cc.).

GALEGA

(gȧ-lē′gȧ)

GALEGA—N.F.

Synonym: European Goat's-rue.
Source: Galega officinalis Linné (Fam. Leguminosæ).
Etymology: Officinalis from the Lat. "officina," *a work shop*, from "opus," *work*, and "facere," *to do*, i.e., kept in the shop or store.
Part Used: The dried, flowering herb.

Description and Physical Properties: *Unground Galega:* Stem smooth, erect, branched, when entire from 15 to 45 cm. long, commonly cut and broken; leaves oddly-pinnate with from 6 to 8 pairs of leaflets; stipules lanceolate, sagittate on one side; leaflets bright green, smooth or slightly hairy, short petioled, lanceolate or ovate-lanceolate, obtuse, slightly mucronate, from 2 to 5 cm. long and from 2 to 6 mm. in width; flowers small, white to violet, in axillary racemes. Odor indistinct; taste mucilaginous, slightly bitter and astringent; it colors the saliva yellowish green.

Habitat: Southern Europe.

Discussion: This is a small perennial, herbaceous plant growing abundantly in the Mediterranean region of Southern Europe. It has a smooth stem bearing from six to eight pairs of alternate leaves. The small, white or violet-colored flowers occur in racemes. The plants are gathered in July and August during the flowering period.

Constituents: Bitter principle; tannin.

Properties and Uses: Galega serves as an example showing the cycle of uses through which many drugs pass before their usefulness is finally determined and they find their own little niche in the scheme of things.

In the Middle Ages galega was used as a medicinal agent against the plague and other malignant fevers. Its virtues were heralded for the treatment of bites by venomous serpents. A thesis was written upon its galactagogue properties, claiming that cows fed on this plant exhibited an increase of from 35 to 50 per cent in milk production. Some medical reports have indicated that it increases the milk of nursing mothers while carefully controlled experiments with cats and dogs produced no such favorable results.

At present the drug is not generally held in high esteem. It still finds some use in domestic medicine as a galactagogue.

Dose: 60 gr. (4 Gm.).

Official Preparation: N.F. V.

Fluidextract of Galega, 1 fl. dr. (4 cc.).

CHRYSAROBINUM

(krĭs′ȧ-rō-bī′nŭm)

CHRYSAROBIN—U.S.P.

Synonym: Crude Goa Powder.

Source: Goa powder, a substance deposited in the wood of Vouacapoua Araroba (Aguiar) Druce (Fam. Leguminosæ).

Etymology: Chrysarobinum from the Gr. "khrysos," *gold*, and "aroba," the East Indian name of the bark, referring to its color.

Goa from the Portuguese colony of Goa on the Malabar Coast of India.

Vouacapoua, the Latinized form of the native Central American name "*vuakapu.*"

Araroba, the Latinized form of the East Indian name of the bark "*aroba.*"

Part Used: A mixture of neutral principles obtained from Goa powder.

Description and Physical Properties: A brownish to orange-yellow, microcrystalline powder. It is tasteless, odorless, and irritating to the mucous membrane.

Chrysarobin is very slightly soluble in water. One Gm. dissolves in 385 cc. of alcohol, 30 cc. of benzene, 180 cc. of carbon disulphide, 13 cc. of chloroform, and in 160 cc. of ether, at 25° C.

Habitat: Brazil, Central America, India.

Discussion: Vouacapoua Araroba is a large tree growing to a height of from 75 to 100 feet. It has a smoothish bark, pari-pinnate leaves, on long petioles, and purplish flowers arranged in paniculate racemes. The wood is yellow and has numerous longitudinal canals and "*lacunæ*" in which the Goa powder is found. Goa powder occurs in greater quantity in the older trees and is recovered by cutting down the tree, splitting the trunk and scraping the powder from the lacunæ. It is a light-yellow powder when fresh, but becomes brownish on exposure.

Constituents: A rather large number of constituents have been described by research chemists. The formula $C_{14}H_6(CH_3)(OH)_3$ has been assigned to chrysarobin itself although it is described by the pharmacopœia as a mixture. In the literature we find the following constituents listed:

dichrysarobinmethylether, $C_{31}H_{26}O_7$,
dichrysarobin, $C_{30}H_{24}O_7$; less important are emodin, emodinmethylether, emodinanthranolmethylether and amorphous substances.

Properties and Uses: Chrysarobin is irritant, producing a diffuse dermatitis and inflammation of the skin if left in contact with it. It is employed in the form of an ointment for psoriasis and parasitic skin diseases of vegetable origin, such as ringworm, favus, acne, and chronic eczema. As it stains badly it should not be used on the face. It must be kept out of the eyes because of its irritant properties. It is not used internally.

Official Preparation: U.S.P. X.
Chrysarobin Ointment.

BAPTISIA

(băp-tĭz′ĭ-ȧ)

BAPTISIA—N.F.

Synonyms: Wild Indigo; Yellow Indigo; Indigo Broom; Indigo Weed.
Source: Baptisia tinctoria (Linné) R. Brown (Fam. Leguminosæ).
Etymology: Baptisia from the Gr. "baptisis," *a dripping*, alluding to the employment of several of the species in dyeing.

Tinctoria from the Lat. "tinctorius," *of* or *pertaining to colors* or *dyeing*, from "tinctor," *a dyer*, from "tingere, tinctum," *to dye.*

Part Used: The dried root.

Description and Physical Properties: *Unground Baptisia:* Fleshy, 0.5 to 4 cm. thick, usually cut into elongated cylindrical pieces; the crown, 5 to 8 cm. thick, more or less warty and marked by stem scars; outer surface dark brown; usually longitudinally wrinkled, the thicker pieces covered with a soft and friable corky layer, bearing few branching rootlets; fracture tough, the fractured surface whitish; bark-section radially striate, wood-section inconspicuously radiate, porous. Nearly odorless; the bark bitter and acrid, the wood nearly tasteless.

Habitat: Eastern United States, Canada.

Discussion: This is a perennial herbaceous plant growing from 2 to 3 feet in height. It grows abundantly in the dry sandy soil, especially along the borders of woods and thickets. The stems are smooth, succulent and erect with numerous leafy branches which terminate in bright-yellow flowers. When bruised, the plant emits a very disagreeable odor. The root has a thick, knotty crown from 2 to 3 inches in diameter and shows several leaf-scars. It is of a dark-brown color and has a bitter, acrid taste.

CONSTITUENTS: Cystine, $C_{11}H_{14}N_2O$, also known as ulexine, sophorine and baptitoxine, a poisonous alkaloid; baptisin, $C_{26}H_{32}O_{14} + 9H_2O$, a glucoside; and a blue dye which has been used in place of indigo in dyeing.

PROPERTIES AND USES: It seems that this drug has been credited with antiseptic properties because it was used as an internal treatment for septic conditions, fevers, locally as an application to ulcers and as a gargle in pharyngitis. Its claims to therapeutic value do not seem to have been demonstrated.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Fluidextract of Baptisia, 15 m. (1 cc.).
Dentifrice.

TAMARINDUS

(tăm′ȧ-rĭn′dŭs)

TAMARIND—N.F.

SOURCE: Tamarindus indica Linné (Fam. Leguminosæ).

ETYMOLOGY: Tamarindus from the Arabic "tamrhindi," literally, *Indian date*, from "tamr," *a dried date*, and "Hind," *India*.
Indica, *of* or *pertaining to India.*

PART USED: The partially dried, ripe fruit deprived of the brittle outer portion of the pericarp and preserved in sugar or syrup.

DESCRIPTION AND PHYSICAL PROPERTIES: A pulpy mass of a light reddish brown color, changing with age to a dark brown, containing some branching fibers and numerous reddish brown, smooth, oblong or quadrangular, compressed seeds, each enclosed in a tough membrane; the pulp with parenchyma cells containing a few starch grains up to 0.020 mm. in diameter, calcium oxalate in rosettes up to 0.100 mm. in diameter, and crystal fibers with prisms of calcium oxalate up to 0.050 mm. in length. Odor distinct; taste sweet and agreeably acid.

HABITAT: India, Africa. Cultivated in the West Indies.

DISCUSSION: Tamarindus indica is a beautiful tree growing from 70 to 80 feet in height and up to 25 feet in circumference. It has a rough, ash-colored bark and compound leaves, each containing from eight to sixteen pairs of leaflets. The handsome yellow flowers occur in racemes and are followed in fruit by indehiscent, smooth, brown legumes.

Tamarind is prepared by first removing the shells of the legumes. In India the pulp is then worked up into a mass with sugar and preserved in jars. In the West Indies hot syrup is poured over the pulp, contained in suitable vessels. In both cases the seeds are left in the pulp. Most of the tamarind used in the United States is imported from the West Indies.

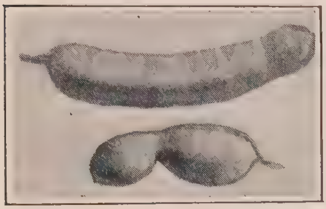


Fig. 79.—Tamarind. ⅓ actual size.

Constituents: Potassium bitartrate, 5 to 6 per cent; tartaric acid, 5 to 9 per cent; citric acid, 4 to 6 per cent; potassium salts of malic and acetic acids; sugar; pectin.

Properties and Uses: Tamarind possesses some virtue as a refrigerant and is used in the form of an infusion in various febrile diseases. It is also laxative and is combined with senna leaves or other laxative drugs for chronic constipation.

Dose: 4 dr. (15 Gm.).

Official Preparation: N.F. V.

Confection of Senna, 60 gr. (4 Gm.).

TRIFOLIUM

(trī-fō′lĭ-ŭm)

TRIFOLIUM—N.F.

Synonym: Red Clover Blossoms.

Source: Trifolium pratense Linné (Fam. Leguminosæ).

Etymology: Trifolium from the Lat. "tri," *three*, and "folium," *leaf*, i.e., its leaves are arranged in sets of three.

Pratense from the Lat. "pratum," *meadow*, i.e., grows in meadows.

Part Used: The dried infloresence.

Description and Physical Properties: *Unground Trifolium:* Heads ovoid with rounded summit, mostly from 12 to 25 mm. in length and width, shriveled, purplish and more or less brown from drying, consisting of many small papilionaceous flowers, crowded together and clothed at the base with broad, pointed ciliate stipules of a pale green color with darker veins, and which may or may not be accompanied by diminutive trifoliate leaves. Flowers from 12 to 15 mm. in length, longer than the four, nearly equal calyx teeth and shorter than the narrower fifth calyx tooth; calyx teeth subulate, tapering; petals united into a tube below, the standard longer than the wings but when recurved appearing shorter; stamens diadelphous (nine and one); style slender. Odor faintly aromatic and somewhat tea-like; taste sweetish, then slightly bitter.

Habitat: Europe. Naturalized in America.

Discussion: This is the common red clover so well-known to the American farmer as a forage crop, and requires no extended description here. The flower-heads are globose or ovoid, approximately 1 inch in diameter and of a beautiful purplish-red color. They have a fragrant odor and an agreeable, sweetish taste.

Constituents: Red clover does not possess any physiologically active constituents. Pratol and pratensol, both phenolic bodies and two or three glucosides have been described. It may contain a trace of volatile oil.

Properties and Uses: Trifolium has been employed as a sedative in whooping-cough and asthma. It is claimed to possess some virtue as an alterative and is used in combination with more active alterative agents.

Dose: 1 dr. (4 Gm.).

Official Preparations: N.F. V.

Fluidextract of Trifolium, 1 fl. dr. (4 cc.).
Compound Fluidextract of Trifolium, 1 fl. dr. (4 cc.).
Compound Syrup of Trifolium, 2 fl. dr. (8 cc.).

MELILOTUS

(mĕl′ĭ-lō′tŭs)

MELILOT—N.F.

Synonyms: Yellow Melilot; Yellow Sweet Clover; Sweet Lucerne.

Source: Melilotus officinalis (Linné) Lamarck (Fam. Leguminosæ).

Etymology: Melilotus from the Gr. "melilotos," *a kind of clover*, from "meli," *honey*, and "lotos," *lotus*, i.e., honey lotus.

Officinalis from the Lat. "officina," *a workshop*, from "opus," *work*, and "facere," *to do*, i.e., kept in the shop or store.

Part Used: The dried leaf and flowering top.

Description and Physical Properties: *Unground Melilot:* Stems mostly less than 3 dm. in length, slender, straight, mostly simple, often leafy below, terminating in long slender racemes, the younger portions very finely pubescent; leaves glabrous or nearly so, petiolate, trifoliate, stipulate, the stipules subulate, entire, the leaflets, from 1 to 3 cm. in length, varying from narrowly oblong to oval or occasionally broader above the middle, rounded, truncate, or slightly notched at the summit, sharply serrate; racemes 1 dm. or less in length, many flowered, the flowers yellow, from 5 to 6 mm. in length; calyx bell-shaped, the five, nearly equal lobes shorter than the tube, corolla papilionaceous, the keel shorter than the other petals, which are about equal; legumes reflexed, from 2.5 to 3.5 mm. in length, obovate, wrinkled, one-seeded. Odor aromatic, tonka-like; taste sweetish, slightly pungent and bitter.

HABITAT: Europe, United States.

DISCUSSION: This is a perennial, herbaceous plant growing from 2 to 4 feet in height. It is found along roadsides and in unused fields. The leaves occur in sets of three, the lower ones notched while the upper ones are entire near the base, but sharply serrate above. The flowers are yellow and occur in small spike-like racemes. The fruit is a small pod containing one or two seeds.

CONSTITUENTS: Coumarin; melilotic acid (hydrocoumaric acid), $C_9H_{10}O_3$; coumaric acid, $C_9H_8O_3$; volatile oil.

PROPERTIES AND USES: Melilot is rarely employed internally in this country. Externally it is applied in the form of a poultice, prepared with hot water, and as such probably exerts the same action as any other suitable material similarly prepared and employed.

OFFICIAL PREPARATION: N.F. V.

Emollient Species.

CHAPTER LX

ARISTOLOCHIACEÆ

(ăr′ĭs-tŏ-lō′kĭ-ā′sē̇-ē)

BIRTHWORT FAMILY

These are mostly herbs or shrubs, many of them woody climbing vines. They number about 200 species and are found for the most part in tropical and subtropical regions. One characteristic is the secretory cells containing the volatile oils. These cells have suberized walls and contain the oils in colorless or yellowish globules.

SERPENTARIA

(sûr′pĕn-tā′rĭ-ȧ)

SERPENTARIA—U.S.P.

Synonyms: Virginia Snakeroot; Texas Snakeroot; Sangrel; Pelican Flower; Birthwort.

Source: Aristolochia Serpentaria Linné, known in commerce as "*Virginia Snakeroot*" (Fam. Aristolochiaceæ), and Aristolochia reticulata Nuttall, known in commerce as "*Texas Snakeroot*" (Fam. Aristolochiaceæ).

Etymology: Serpentaria from the Lat. "serpens," *a snake*, because the roots were formerly used in cases of snake bite.

Aristolochia from the Gr. "aristos," *best*, and "locheia," *childbirth*, because it was thought to be an aid to parturition.

Reticulata from the Lat. "reticulatus," *netted*, referring to the venation of the leaves.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Serpentaria:* Rhizome oblique, subcylindrical, more or less curved, from 10 to 30 mm. in length and from 1 to 2 mm. in diameter; externally dark brown, upper portion with short stem-bases and lower and lateral portions with numerous long, thin, nearly straight, yellowish-brown roots; fracture short; internally yellowish white; wood with broad, eccentric wedges; odor camphoraceous, terebinthinate; taste bitter, aromatic.

Habitat: United States. Aristolochia Serpentaria is found in Western Pennsylvania, Virginia, Ohio, Indiana and Kentucky. Aristolochia reticulata is found in the Southwestern States from Louisiana to Texas.

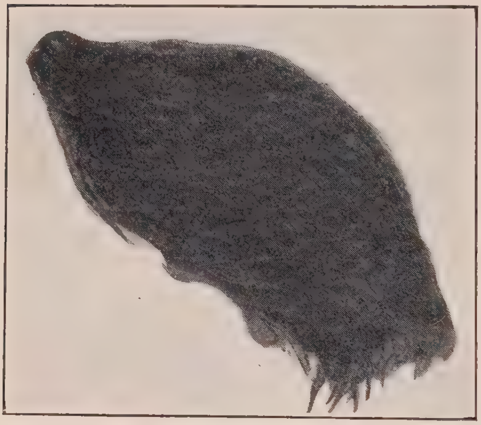


Fig. 80.—Serpentaria.

Discussion: Aristolochia Serpentaria is a perennial, herbaceous plant with several stems arising from the same rhizome. The stems are usually less than a foot in height, slender, round, and frequently red or purple at the base. The flowers spring from near the root and stand singly on long, slender peduncles. The fruit is a six-sided, six-celled capsule.

Aristolochia reticulata is very similar to the preceding except that the stems are somewhat branched near the base and the venation of the leaves is more conspicuous.

Constituents: Aristolochine, a bitter alkaloid; volatile oil; resin; tannin.

Properties and Uses: Serpentaria is a simple bitter and, because of its volatile oil, possesses a warm, pungent, aromatic taste which makes it serviceable not alone as a bitter tonic but as a vehicle for more active agents. It is used alone and in combination to increase the appetite and to aid in correcting indigestion.

Dose: 15 gr. (1 Gm.).

Official Preparation: U.S.P. X.

Compound Tincture of Cinchona, 1 fl. dr. (4 cc.).

ASARUM

(ăs′à-rŭm)

ASARUM—N.F.

Synonyms: Wild Ginger; Canada Snakeroot.

Source: Asarum canadense Linné (Fam. Aristolochiaceæ).

ETYMOLOGY: Asarum from the Gr. "asaron," the name of the plant. Canadense, of or pertaining to Canada.

PART USED: The dried rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Asarum:* Rhizome horizontal, 5 to 17 cm. long, 2 to 4 mm. thick, occasionally branched, two-edged when young, quadrangular when older, finely striate, more or less twisted; nodes enlarged with irregular scars from petioles and remains of pedicels; internodes with annular scars from scales; dark purplish brown externally; fracture short, internally whitish, starchy or resinous; roots few, 5 to 7 cm. long up to 1 mm. thick. Odor, ginger-like or recalling serpentaria, non-irritating upon heating; taste pungent and slightly bitter.

HABITAT: Eastern United States, Canada.

DISCUSSION: Asarum is a small, perennial herbaceous plant growing abundantly in the rich woodlands of the northeastern part of the United States. It has a creeping rhizome from 3 to 6 inches in length. This gives rise to a short stem bearing two reniform leaves and a single brownish-purple flower. The rhizome is collected in the spring, cleaned and carefully dried. It has an aromatic odor and a bitter pungent taste.

CONSTITUENTS: Volatile oil, 1 to 3 per cent; resin; asarin, a yellow coloring matter. The volatile oil, in turn, consists principally of methyl eugenol, $C_{10}H_{11}(CH_3)O_2$; *d*-linalool; *l*-terpineol; *l*-borneol; geraniol, all having the formula $C_{10}H_{17}OH$; a lactone, $C_{14}H_{20}O_2$.

PROPERTIES AND USES: Asarum is a mild aromatic stimulant, carminative and tonic.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Compound Syrup of Asarum, 1 fl. dr. (4 cc.).

CHAPTER LXI

SANTALACEÆ

(săn′tȧ-lā′sē̇-ē)

SANDALWOOD FAMILY

This is a family of herbs, shrubs, or rarely trees, found for the most part in the tropics. It comprises 26 genera and about 250 species. They have clustered apetalous monœcious or diœcious flowers, the ovary being partly inferior and the fruit a drupe or a nut. Most of them are root parasites. Several of the species contain volatile oils. Groups of cells with silicified walls are found in the leaves and calcium oxalate occurs in the form of rosettes or solitary crystals.

(*a*) SANTALUM ALBUM

(săn′tă-lŭm al′bŭm)

SANDALWOOD—N.F.

(*b*) OLEUM SANTALI

(ō′lē̇-ŭm săn′tă-lī)

OIL OF SANTAL—U.S.P.

Synonyms: (*a*) Santalwood; White Sandalwood; White Santalwood.
(*b*) Oil of Sandalwood; Santalwood Oil.

Source: Santalum album Linné (Fam. Santalaceæ).

Etymology: Santalum from the Arabic "ssandal," the name of the wood. The Malayese name is "tsjendan" and the Persian "sandul," all signifying *useful.*

Album from the Lat. "albus," *white,* i.e., the color of the sapwood.

Part Used: (*a*) The heartwood.

(*b*) The volatile oil distilled from the dried heartwood. The pharmacopœia requires it to yield not less than 90 per cent of alcohols calculated as santalol ($C_{15}H_{24}O$).

Description and Physical Properties: (*a*) In billets, pieces or chips of varying shapes and sizes, heavy, hard but splitting easily, color light yellow to light brown. Odor characteristic, aromatic, persistent; taste peculiar, strongly aromatic.

(*b*) A pale yellow, somewhat viscid, oily liquid, having the characteristic odor and taste of sandalwood.

Habitat: Southern India, East Indies, Malabar.

Discussion: Santalum album is a small tree growing 20 or 30 feet in height and is found in the mountainous portions of India and several of the East India Islands. The wood is very fragrant and is much used for making joss sticks, paper knives, fan ribs, etc. It is also used in the funeral rites and religious ceremonies of the Buddhist. The volatile oil, which is obtained by steam distillation of the shavings and turnings of the wood, is a pale-yellow, somewhat thick liquid of characteristic odor and taste. In the past it was frequently adulterated, castor oil and other fixed oils, gurjun balsam, and oil of cedar being used. In 1925, 22,014 pounds of sandalwood oil were imported.

Constituents: (*a*) Sandalwood: Santal oil, about 5 per cent.

(*b*) Santal oil: Santalol is the most important constituent, constituting about 90 per cent of the oil; α and β santalal; several sesquiterpenes.

Properties and Uses: Oil of santal is a stimulating expectorant in chronic bronchitis and a genito-urinary antiseptic of considerable value. It is excreted in part by the bronchial mucous membrane and to a greater extent by the genito-urinary tract, the mucous membranes of both tracts being stimulated and bathed antiseptically during its passage. Thus it is used in bronchitis, pyelitis and chronic gonorrhea, cystitis and gleet. It acts in all these conditions like cubeb and copaiba with which it is frequently combined. In gonorrhea it should be continued for some time after the discharges have ceased. The wood is burned in the Chinese temples as an incense, and the oil is used in vast quantities in the manufacture of perfume. It is used to scent many toilet soaps.

Dose: (*a*) Sandalwood, 60 gr. (4 Gm.).
(*b*) Santalwood Oil, 8 m. (0.5 cc.).

Official Preparations: N.F.

(*a*) Sandalwood:

Compound Elixir of Sabal and Sandalwood, 1 fl. dr. (4 cc.).
Fluidextract of Sandalwood, 1 fl. dr. (4 cc.).
Tincture Saw Palmetto and Sandalwood, 1 fl. dr. (4 cc.).

CHAPTER LXII

ERICACEÆ

(ĕr′ĭ-kā′sē̇-ē)

HEATH FAMILY

This is a very large and widely distributed family. It numbers about 55 genera and 1100 species and is especially abundant in the northern mountainous regions of both hemispheres. Many of the members are herbs, others erect or prostrate shrubs and some small trees. The leaves are deciduous or evergreen, the flowers regular and the fruit a capsule or drupe.

UVA URSI

(ū′vȧ ûr′sī)

UVA URSI—U.S.P.

Synonyms: Bearberry; Mountain Box; Kinnikinnic; Upland Cranberry; Mountain Cranberry; Wild Cranberry; Universe Vine; Barren Myrtle.

Source: Arctostaphylos Uva-ursi (Linné) Sprengel (Fam. Ericaceæ).

Etymology: Uva Ursi from the Lat. "uva," *a grape*, and "ursus," *a bear*, i.e., bear grapes, signifying that they grow wild.

Arctostaphylos from the Gr. "arktos," *a bear*, and "staphyle," *a bunch of grapes*, signifying that they grow wild.

Ericaceæ from the Lat. "erice," *heath*, the heath being a prominent member of the family.

Kinnikinnic is the American Indian name of the plant and means, literally, *a mixture*, referring to the fact that a mixture of various leaves and barks were used to smoke.

Part Used: The dried leaves.

Description and Physical Properties: *Unground Uva Ursi:* Usually unbroken, obovate, oblong or spatulate, from 12 to 30 mm. in length, from 5 to 13 mm. in breadth; apex obtuse or rounded; margin entire, slightly revolute; base cuneate, tapering into a short, stout petiole; upper surface dark green, glabrous and shiny, finely reticulate; under surface yellowish green and slightly pubescent, especially on the midrib; coriaceous; fracture short; odor slightly aromatic, tea-like; taste astringent and somewhat bitter.

HABITAT: Northern Europe, North America, Northern Asia.

DISCUSSION: Uva ursi is a low, evergreen shrub with recumbent stems, the young branches of which rise obliquely. The leaves are nearly an inch in length, entire, obtuse at the apex and acute at the base. The flowers are reddish in color and occur in small clusters at the ends of the branches. The fruit is a small, red berry, also occurring in clusters. In America uva ursi is found growing from Hudson Bay as far south as New Jersey. It thrives best on barren hills and dry, sandy plains.

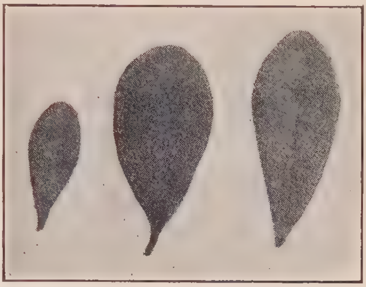


FIG. 81.—Uva Ursi.

CONSTITUENTS: Volatile oil; arbutin, $C_{12}H_{16}O_7 + H_2O$; methyl-arbutin, $C_{12}H_{15}(CH_3)O_7 + H_2O$; ericolin, $C_{34}H_{56}O_{21}$; quercetin, $C_{15}H_{10}O_7$; tannin, 6 to 7 per cent. Arbutin is a glucoside and is decomposed somewhere in the system, probably in the urinary tract, yielding hydroquinone, $C_6H_4(OH)_2$, which is antiseptic.

PROPERTIES AND USES: Uva ursi is a slight renal stimulant and a mild antiseptic. It is employed in a variety of conditions for these effects, urethritis, chronic cystitis, pyelitis and gonorrhea being examples. Large doses cause a dark color in the urine.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Fluidextract of Uva Ursi, 30 m. (2 cc.).

CHIMAPHILA

(kī-măf'ĭ-lȧ)

CHIMAPHILA—N.F.

SYNONYMS: Pipsissewa; Prince's Pine; King's Cure; Ground Holly; Love-in-winter; Bitter Wintergreen.

SOURCE: Chimaphila umbellata (Linné) Barton (Fam. Ericaceæ).

ETYMOLOGY: Chimaphila from the Gr. "cheima," *winter*, and "philos," *loving*, i.e., the plant remains green during the winter.

Umbellata from the Lat. "umbellatus," *characterized by umbels*, from the fact that the flowers occur in corymbose umbels.

Pipsissewa is an American-Indian name for the plant.

PART USED: The dried leaves.

Description and Physical Properties: *Unground Chimaphila:* Oblanceolate, from 2.5 to 7 cm. long and from 8 to 20 mm. wide, the upper portion coarsely and sharply serrate, acute or somewhat obtuse, the lower wedge-shaped and nearly entire; coriaceous, smooth and uniformly dark green on the upper surface, paler beneath, the veins prominent. Odor slight; taste astringent and bitter.

Habitat: Northern and Central Europe, Northern Asia, North America.

Discussion: This is a small evergreen growing from 6 to 10 inches in height and having several erect or semi-procumbent stems and a perennial, creeping rhizome. The leaves are wedge-shaped and occur in irregular whirls of which there are usually two on the same stem. The flowers are white, often tinged with red, and are disposed in small terminal corymbs.

Constituents: Chimaphilin, $C_{24}H_{21}O_4$; arbutin; ericolin; tannin.

Properties and Uses: Chimaphila is very similar in its action to uva ursi and is used for the same purposes, but is more astringent.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Fluidextract of Chimaphila, 30 m. (2 cc.).
Compound Fluidextract of Stillingia, 30 m. (2 cc.).
Compound Syrup of Stillingia, 1 fl. dr. (4 cc.).

CHAPTER LXIII

CORNACEÆ

(kŏr-nā′sē-ē)

DOGWOOD FAMILY

This family numbers 16 genera and about 85 species, consisting of herbs, shrubs and trees. Its members are found for the most part in the temperate regions. They have small, clustered flowers with the calyx tube adherent to the ovary. The fruit is a drupe.

CORNUS

(kôr′nŭs)

CORNUS—N.F.

Synonyms: Dogwood Bark; Flowering Dogwood.

Source: Cornus florida Linné (Fam. Cornaceæ).

Etymology: Cornus from the Lat. "cornu," *horn*, in allusion to its hard wood.

Florida from the Lat. "floridus," *abounding in flowers*, from "flos, floris," *a flower*.

Part Used: The dried root bark.

Description and Physical Properties: *Unground Cornus:* In irregular, chip-like pieces, or portions of quills, usually less than 5 cm. in length; bark from 1 to 4 mm. in thickness; externally scaly and of a dingy brown color, with a few minute root scars or finely roughened, and of a reddish color where the corky layers have been removed; heavy cork patches wanting (absence of trunk bark); inner surface varying from pinkish brown to reddish brown, roughened from numerous short striæ; fracture short, the broken surface purplish or pinkish-white and roughened from light-colored projecting groups of stone cells. Odor slight; taste bitter and astringent.

Habitat: Eastern United States.

Discussion: Cornus florida is a small, but very beautiful tree quite common in dry woodlands throughout the eastern portion of the United States. The wood is fine-grained and very hard. The tree has a peculiar infloresence consisting of four large white, or purplish bracts which are commonly supposed to be the flowers. The real flowers occur in clusters and are very small, being followed in fruit by small, scarlet-colored drupes. The drug occurs in the form of short quilled pieces, or irregular chip-like fragments of bark. It is of a brownish color externally and pinkish or purplish-brown within.

CONSTITUENTS: Cornin (cornic acid), a bitter principle; gallic acid; tannic acid; resin.

PROPERTIES AND USES: Cornin is a feeble simple bitter, while the tannic and gallic acids act as mild astringents.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Cornus, 30 m. (2 cc.).

CHAPTER LXIV

STYRACEÆ

(stī'rā'-sē̇-ē)

STYRAX FAMILY

This family, also called the *Styracaceæ,* consists of 6 genera and about 100 species. They consist of trees and shrubs and are found for the most part in tropical South America, a few occurring in the United States. The leaves are simple and alternate. The flowers have a 5-lobed corolla and ten stamens. The fruit is a dry capsule or a drupe.

BENZOINUM

(bĕn-zō̇-ī'nŭm)

BENZOIN—U.S.P.

Synonyms: Gum Benzoin; Sumatra Benzoin; Siam Benzoin; Gum Benjamin.

Source: Styrax Benzoin Dryander, known in commerce as "*Sumatra Benzoin,*" or from other species of Styrax, known in commerce as *Siam Benzoin.* The pharmacopœia requires that Sumatra benzoin yield not less than 75 per cent of alcohol-soluble extractive and not more than 1 per cent of acid-insoluble ash. Also that Siam benzoin contain not more than 1 per cent of foreign organic matter, and yield not less than 90 per cent of alcohol-soluble extractive, and not more than 0.5 per cent of acid-insoluble ash.

Etymology: Benzoinum from the Hebrew "ben," *a branch,* and "zoa," *a secretion,* from the fact that the secretion exudes whenever a branch is wounded.

Styrax from the Arabic "assthirak," signifying *a tree yielding gum.*

Part Used: The balsamic resin.

Description and Physical Properties: *Unground Sumatra Benzoin:* Blocks or lumps of varying size, made up of tears, compacted together with a reddish-brown, reddish-gray, or grayish-brown resinous mass; tears externally yellowish or rusty brown, milky white on fresh fracture; hard and brittle at ordinary temperatures, but softened by heat and becoming gritty on chewing; odor aromatic. When digested with boiling water the odor suggests cinnamic acid or storax; taste aromatic and slightly acrid.

Unground Siam Benzoin: Pebble-like tears of variable size, compressed, yellowish brown to rusty brown externally, milky white on fracture, separate or very slightly agglutinated, hard and brittle at ordinary temperatures but softened by heat and becoming plastic on chewing; odor agreeable, balsamic, vanilla-like; taste aromatic and slightly acrid.

HABITAT: Siam, Cochin China, Malay Peninsula, Sumatra, Java, Borneo.

DISCUSSION: Styrax Benzoin is a large tree with whitish, downy bark and oblong, pointed leaves which are also downy on the under surface. The flowers are disposed in compound axillary clusters. The balsam, which is entirely a pathological product, is collected by cutting notches into the trunk and larger branches of the tree. The balsam oozes out of the bark and collects at the lower edge of the wound. It is then removed and sorted into several different grades and sent to Singapore from which port it is shipped to the markets of the world.

The period of collection is usually from July to November, although it is stated that the tree will yield benzoin throughout the year. At that period of the year the laborers are free from the care of the rice fields which is the most important industry and claims first attention at other times.

There are two commercial varieties of benzoin, the "*Siam*" and the "*Sumatra*." The former occurs in pebble-like tears of variable size. It has a yellowish-brown to rusty-brown color externally, but is milky white within. It is hard and brittle at ordinary temperatures, but softens with heat and becomes plastic on chewing. The Sumatra benzoin occurs in blocks or lumps of varying size and is made up of tears compacted together. It has a reddish-brown, reddish-gray or grayish-brown color externally, but is also milky white within. It is hard and brittle at ordinary temperatures, but softens with heat and becomes gritty on chewing.

CONSTITUENTS: Volatile oil, 0.3 per cent; resin; benzoic acid, 10 to 20 per cent; cinnamic acid; vanillin, 0.1 to 1 per cent; styracin, 2 to 3 per cent; styrol; benzaldehyde; phenyl-propyl-cinnamate. Benzoic acid can be obtained from either variety by simple sublimation. The yield, however, can be greatly increased by splitting up the esters, liberating the free benzoic acid. As high as 25 per cent of benzoic acid has been obtained from the best grades of benzoin by this method.

PROPERTIES AND USES: Benzoin is a stimulating expectorant, being excreted in part by the mucous membrane of the respiratory tract which it stimulates and antisepticises during its passage. It is used in bronchitis and laryngitis for this action. It is also a diuretic and genito-urinary antiseptic. During its passage through the kidneys, the benzoic acid is converted into hippuric acid, rendering the urine more acid. Thus it is used in chronic cystitis and in the later stages of gonorrhea. The tincture of benzoin is applied locally as a stimulant and antiseptic to wounds, sores and ulcers and is especially useful in scabies.

Dose: 15 gr. (1 Gm.).

Official Preparations: U.S.P. X.

Benzoinated Lard.
Tincture of Benzoin, 15 m. (1 cc.).
Compound Tincture of Benzoin, 30 m. (2 cc.).

CHAPTER LXV

OLEACEÆ

(ō′lė̄-ā′sė̄-ē)

OLIVE FAMILY

This is a widely distributed family consisting of 21 genera and about 500 species. They consist of shrubs and trees and have opposite, rarely alternate, exstipulate leaves, tetramerous flowers and drupaceous fruits.

OLEUM OLIVÆ

(ō′lē-ŭm ŏ-lī′vē)

OLIVE OIL—U.S.P.

Synonym: Sweet Oil.

Source: Olea europæa Linné (Fam. Oleaceæ).

Etymology: Olea from the Lat. "oliva," *the olive fruit,* from the Gr. "elaia," *the olive tree*, from "elaion," *oil*, referring to the oily nature of the ripe fruit.

Europæa, the Lat. for "*European*," referring to the habitat.

Olive has the same etymological source as "olea."

Part Used: The fixed oil obtained from the ripe fruit.

Description and Physical Properties: A pale-yellow, or light greenish-yellow, oily liquid, having a slight, peculiar odor and taste, with a faintly acrid after-taste.

Habitat: Spain, Italy, France, Greece and the Levant. Cultivated in the United States and other temperate climates.

Discussion: The olive tree is small, usually not more than 15 or 20 feet in height. The trunk and branches are rugged and twisted, and are often split for long distances. The tree has small, white flowers, arranged in axillary clusters, and smooth evergreen leaves from 2 to 3 inches in length. The fruit is a smooth, oval drupe, green at first, but ripening to a deep-violet color. It has a single seed and an edible, fleshy pericarp.

The olive tree has a very long history, its branches having been used as the emblem of peace since very early times. The fruit and its oil were used by the ancient Hebrews and are frequently mentioned in the Old Testament. The fruit, preserved in brine, was used as an article of food by the ancient Romans. Specimens, so preserved, have been found in the ruins of Pompeii.

In late years the cultivation of the olive has become an important industry in California. The California fruit and oil are of a superior quality and have been received with favor by the American people.

The yield of oil is greatest when the fruit is thoroughly ripe, sometimes reaching as high as 75 per cent of the weight of the fruit. The normal yield is about 50 per cent. Only the ripe olives are employed for the recovery of the oil. They are picked by hand, crushed and subjected to a moderate pressure, the oil being run into vessels containing water. After standing for several days, it is syphoned off and, after standing 6 to 8 months, constitutes the best grade or *virgin oil.* The pulp from this pressing is broken up and subjected to greater pressure, sometimes with the addition of hot water. After a time this oil is removed and constitutes the "*second grade oil*" of the market. The remaining marc is now mixed with the over-ripe fruit which has fallen to the ground, allowed to ferment and is subjected to a still greater pressure. The oil from this pressing is darker in color and has an earthy unpleasant odor. This constitutes the "*third grade oil*" or "*pressings.*"

Before the enactment of the National Food and Drugs Act, olive oil was frequently adulterated, the oils most commonly employed for that purpose being cottonseed, peanut, sesame, poppyseed and the oil from sunflower seeds. The importation of edible olive oil during the year 1925 amounted to 90,426,346 pounds, its declared value amounting to $15,656,307. During the same period 51,706,955 pounds of inedible olive oil and 4,971,065 pounds of olives were imported.

CONSTITUENTS: Olein, about 72 per cent; palmitin, about 28 per cent.

PROPERTIES AND USES: Olive oil is demulcent, nutrient and laxative. It is in part broken up in the duodenum, glycerin being liberated and the fatty acids combining with the alkali present. The soap thus formed emulsifies the balance of the oil which is absorbed in the same manner as other oils. It is used internally as a demulcent protective in cases of poisoning by irritant or corrosive substances. Olive oil is used internally by many persons as a nutrient, in the treatment of biliary colic and by some with the idea of preventing the formation of gallstones. It enters into the composition of liniments, cerates and ointments for external use, and is used as a mechanical lubricant in the passing of sounds, catheters, pessaries, etc.

Dose: 1 fl. oz. (30 cc.).
Official Preparation: U.S.P. X.
Lead Oleate Plaster.

MANNA

(măn′ȧ)

MANNA—U.S.P.

Source: Fraxinus Ornus Linné (Fam. Oleaceæ).

Etymology: Manna from the Gr. "manna" (Hebrew "man"; Arabic, "mann"), signifying *gift from heaven*, i.e., food divinely supplied.

Fraxinus, the Lat. name for the tree, from the Gr. "phrassozo," *to fence in, to enclose*, i.e., used for making hedges or fences.

Ornus, the Lat. name for the wild mountain ash, referring to the resemblance.

Part Used: The dried exudation. The pharmacopœia requires that it yield not less than 75 per cent of anhydrous alcohol-soluble extractive, when extracted with boiling 90 per cent alcohol, by volume.

Description and Physical Properties: In irregular, more ore less elongated, flattened, 3-sided pieces; externally yellowish-white; friable; internally nearly white, porous and crystalline in appearance; odor slight, but characteristic; taste sweet, slightly bitter and faintly acrid. Also in irregular masses, consisting in part of brittle or soft fragments from yellowish-white to yellowish-gray in color. The quantity of these yellowish-white fragments must not be less than 40 per cent of the whole.

Habitat: Mediterranean Basin from Spain to Asia Minor.

Discussion: This drug must not be confused with the manna of the Scriptures which was an edible lichen used by the Israelites as a food during their journey through the wilderness of Arabia. This lichen (Lecanora esculenta), which still grows in that region, selects the soil as a substratum during the early period of its growth, but is torn loose by the wind and sometimes falls like rain, or is blown into heaps, in the deserts of Arabia and Africa. The tree yielding manna frequently called "European flowering ash" attains a height of but 15 to 25 feet. Its flowers are white and its leaves are pinnately divided and consist of several pairs of leaflets. A portion of the manna exudes spontaneously during the hot season, concreting upon the bark, but as this exudation is very slow and the yield small, it has been found profitable to make transverse notches about two inches long and an inch apart through the bark to the sapwood. Beginning at the foot of the tree, one notch is cut each day as long as the dry weather lasts. The following season notches are made on the opposite side of the tree, and thus alternating from year to year for 10 to 12 years.

Straw or leaves are so placed as to collect the exudation from the lower notches. This constitutes the poorest grade of manna. That which concretes higher up on the tree is better. After removing the manna from the tree, it is placed upon shelves to dry and harden. That collected later in the season, or when the air is moist, is very difficult to dry. In 1924, 42,181 pounds of manna were imported.

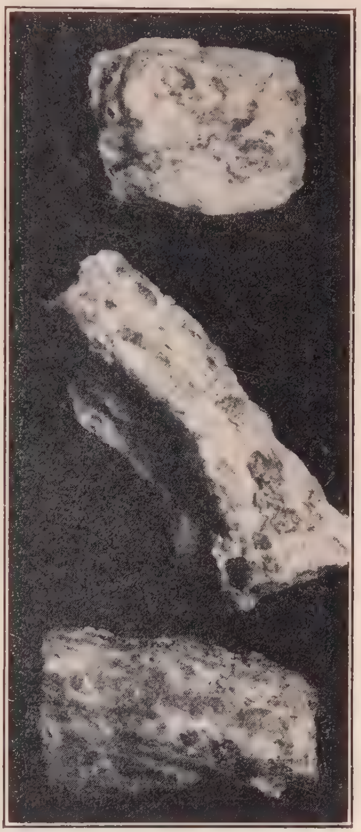


Fig. 82.—Manna.

Constituents: Mannite, $C_6H_8(OH)_6$, a sweet hexatomic alcohol, constitutes from 30 to 90 per cent of the drug. Sucrose and invert sugar, 2 to 30 per cent; gum, citric acid, mucilage, and a glucoside called "*fraxin*," $C_{16}H_{18}O_{10}$, are also present in varying amounts.

Properties and Uses: Manna is used as a very mild laxative, usually in combination with other and more active drugs, as rhubarb, senna or magnesium oxide, for which it serves as a vehicle. It is given mostly to children as it is not active enough for older persons. If given alone in doses sufficient to produce catharsis, it is apt to cause flatulence and colic. It is often combined with cathartic drugs for the purpose of masking their taste.

Dose: 4 dr. (15 Gm.).

Official Preparation: N.F. V.

Compound Infusion of Senna, 4 fl. oz. (120 cc.).

CHIONANTHUS

(kī′ō̆-năn′thŭs)

CHIONANTHUS—N.F.

Synonyms: Fringe Tree Bark; Graybeard; Shavings Tree; Old Man's Beard.

Source: Chionanthus virginica Linné (Fam. Oleaceæ).

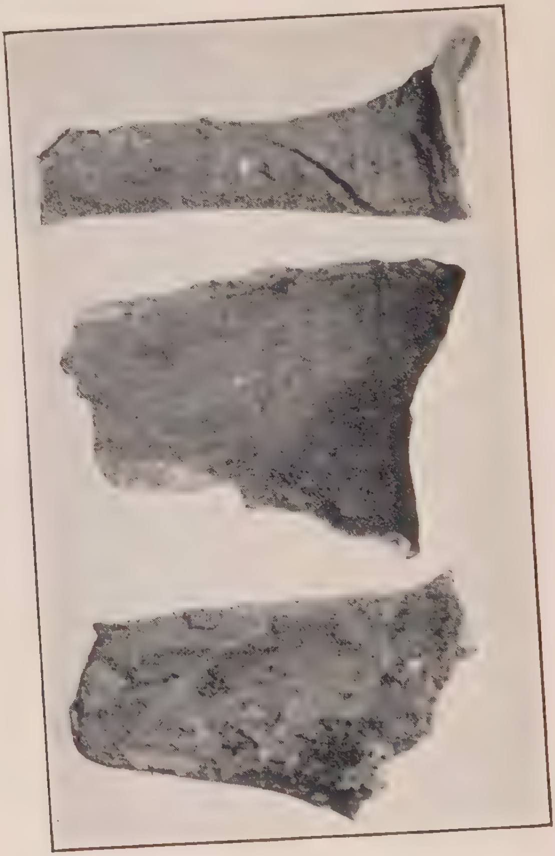


Fig. 83.—Chionanthus.

Etymology: Chionanthus from the Gr. "khion," *snow*, and the Lat. "anthus," *a kind of small bird.*

Virginiana, *of* or *pertaining to Virginia*, its habitat.

Part Used: The dried bark of the root yielding to 70 per cent alcohol not less than 25 per cent of non-volatile extractive.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Chionanthus:* Usually in transversely curved pieces, occasionally in single quills from 1 to 10 cm. long; bark from 2 to 10 mm. thick; heavy, some pieces of the whole drug sinking when thrown into water; outer surface usually reddish brown, occasionally grayish brown, with few transverse wrinkles; scaly, roughened by shallow pits and ridges, whitish cork patches and root-scars; inner surface yellowish brown, more or less striate and undulate; fracture short, hard and coarsely granular, the broken surface of a light yellowish-white color. Odor characteristic; taste bitter.

HABITAT: Southeastern United States.

DISCUSSION: This is a very attractive arboraceous tree or shrub much used in landscape gardening in our Southern States. The bark occurs in the market in the form of curved pieces or quills from 1 to 4 inches in length. It is reddish-brown externally and yellowish within. It has a strong odor and a characteristic bitter taste.

CONSTITUENTS: Bitter principle; tannin.

PROPERTIES AND USES: This drug is a favorite alterative and blood-purifier in the Homeopathic and Eclectic medical practice. It is largely employed in liver disorders.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Chionanthus, 30 m. (2 cc.).

CHAPTER LXVI

GENTIANACEÆ
(jĕn′shĭ-ȧ-nā′sḗ-ē)

GENTIAN FAMILY

This is a large family numbering 50 genera and more than 500 species. They are opposite-leaved, mostly bitter herbs, and are widely distributed. They have regular, often handsome flowers with a 1-celled ovary followed by a 2-valved capsule.

GENTIANA
(jĕn′shĭ-ā′nȧ)

GENTIAN—U.S.P.

Synonyms: Yellow Gentian; Gentian Root; Bitter Root; Bitterwort.

Source: Gentiana lutea Linné (Fam. Gentianaceæ).

Etymology: Gentiana from the Gr. "Gentiane," named for Gentius, a king of the Illyrians about 200 B.C., who is reputed to have discovered the medicinal value of the plant.

Lutea from the Lat. "luteus," *golden yellow*, referring to the color of the flowers.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Gentian:* In pieces nearly cylindrical, sometimes branched, from 5 to 40 mm. in thickness; the rhizome portions annulate and the roots longitudinally wrinkled; externally yellowish brown; brittle when dry, tough and flexible when damp; internally yellowish brown, with a cortex from 0.5 to 2 mm. in thickness, separated from a spongy wood by a dark brown cambium zone and distinctly radiate in appearance, especially in the region of the cambium; odor strong and characteristic; taste slightly sweetish at first, then strongly and persistently bitter.

Habitat: Central and Southern Europe.

Discussion: This is a remarkably beautiful perennial plant growing from 3 to 4 feet in height. It has an erect, round stem with opposite, sessile leaves. The flowers are large and of a beautiful golden color, occurring in whorls at the axils of the upper leaves. The root is a simple taproot, sometimes 3 or more feet in length. The plant is found in the Alps, Pyrenees, Jura, Vosges and Apennines Mountains at an elevation of from 3000 to 4000 feet. 611,318 pounds of gentian were imported in 1924.

Constituents: Gentiopicrin, $C_{16}H_{20}O_9$, a bitter glucoside upon which the activity of the plant depends; gentisin (gentianin), $C_{14}H_{10}O_5$; gentiamarin; pectin.

Properties and Uses: Gentian is a bitter tonic, increasing the appetite and promoting gastric digestion. Large over-doses will upset the stomach, irritate the bowel and cause purging and vomiting. It is employed in gastric and intestinal catarrh, dyspepsia and atonic conditions generally. It probably is the most largely used of all of the simple bitters.

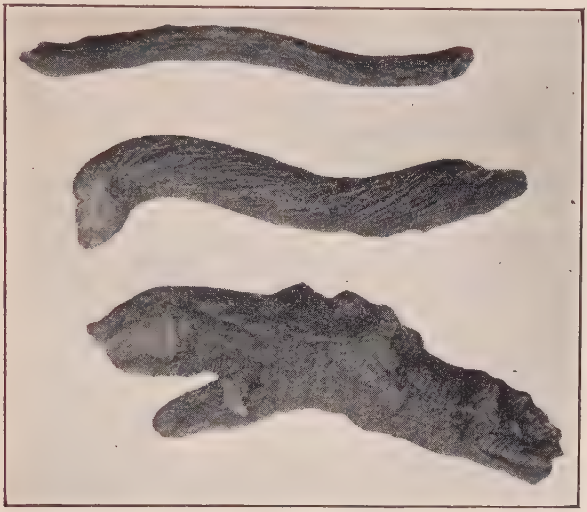


Fig. 84.—Gentian.

Dose: 15 gr. (1 Gm.).

Official Preparation: U.S.P. X.

Compound Tincture of Gentian, 1 fl. dr. (4 cc.).

CHIRATA

(chĭ-rä′tȧ)

CHIRATA—N.F.

Synonyms: Chiretta; Bitter Stem; East Indian Balmony.

Source: Swertia Chirayita (Roxburg) Lyons (Fam. Gentianaceæ).

ETYMOLOGY: Chirata is the East Indian name of the plant and is derived from "Kiratas," a tribe of Himalayan mountaineers by whom it was much used.

Swertia was given in honor of Emanuel Sweerts, a Dutch botanist born in 1552.

PART USED: The dried plant.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Chirata:* Smooth; root simple, about 7 mm. thick near the crown; stem about 1 M. in length, externally yellowish or purplish brown, cylindrical near the base, quadrangular and slightly winged above, with numerous opposite, ascending branches; wood yellowish, thin, enclosing usually a large, yellowish easily separable pith; leaves opposite, sessile, ovate-lanceolate, entire, five-nerved, up to 6 cm. long; flowers numerous, panicled, small, with a four-lobed calyx and corolla; capsule ovoid, acute, one-celled, many-seeded. Odor slight; taste intensely bitter.

HABITAT: Himalaya Mountains in Northern India.

DISCUSSION: This is an annual plant with a smooth, erect stem growing about 3 feet in height. It bears beautiful yellow flowers in large numbers. When they begin to wilt, the plants are gathered, tied into bundles and shipped to the drug markets of Europe.

CONSTITUENTS: Chiratin, $C_{26}H_{48}O_{15}$, a bitter glucoside which is yellow in color and hygroscopic. It is soluble in ether, alcohol and warm water; ophelic acid, $C_{13}H_{20}O_{10}$, a bitter, syrupy liquid, soluble in water and alcohol.

PROPERTIES AND USES: Chirata is classed as a simple bitter along with gentian and calumba.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Chirata, 15 m. (1 cc.).

CENTAURIUM

(sĕn-tô′rĭ-ŭm)

CENTAURY—N.F.

SYNONYMS: Christ's Ladder; Bloodwort; Mountain Flax.

SOURCE: Erythræa Centaurium (Linné) Persoon (Fam. Gentianaceæ).

ETYMOLOGY: Centaurium from the Gr. "kentaurion," *the centaur Chiron.* In Greek mythology the centaurs were a race, descendants of Ixion, dwelling in the mountains of Thessaly. They were represented as wild and coarse, their bodies being half man and half horse. Chiron, the most famous of the centaurs, was renowned for his wisdom and skill in medicine. He was represented as the instructor of Achilles and Asclepiades. This plant was named for the centaur Chiron because he was supposed to have discovered its medicinal properties.

Erythræa, of or pertaining to Erythræ, an ancient Ionian city of Asia Minor.

Part Used: The dried flowering herb.

Description and Physical Properties: *Unground Centaury:* Glabrous, from 1.5 to 5 dm. in length, much branched from the base, but little branched, if at all, from above; stems slender, sharply angled or narrowly winged, sparsely leafy; leaves opposite, entire, mostly three-nerved, sessile, those at the base obovate and obtuse, from 2 to 5 cm. long, their bases narrowed and petiole-like, those above oval, ovate, or even lance-linear, acute; flowers in a terminal and at length compound cyme, rose-colored; calyx from 5 to 7 mm. long, deeply five-parted, the tube short, sharply angled, lobes linear-attenuate with a sharp midrib; corolla tube nearly twice the length of the calyx, slender, the limb from 10 to 15 mm. wide, its lobes broadly oblong or oval; stamens five, exserted, bright yellow, their anthers twisted when old; pistil two-carpelled. Odor faint but characteristic; taste persistently bitter.

Habitat: Central and Southern Europe.

Discussion: This is a small, herbaceous plant growing from 1 to 2 feet in height. It is indigenous to central and southern Europe, but has become naturalized in Canada and the northeastern portion of the United States. The heart-shaped leaves are about 1 inch in length. The flowers are of a deep-rose color.

Constituents: A bitter principle very similar to those contained in gentian and chiretta.

Properties and Uses: Because of this bitter principle, centaury is a bitter stomachic and tonic. It is also diaphoretic and febrifuge.

Dose: 30 gr. (2 Gm.).

Official Preparation: N.F. V.

Bitter Tincture, 30 m. (2 cc.).

CHAPTER LXVII

LOGANIACEÆ

(lō̇-gā′nĭ-ā′sē̇-ē)

NUX VOMICA FAMILY

This family, numbering some 32 genera and more than 350 species, is widely distributed. It consists of herbs, shrubs, woody vines and trees, and furnishes some of our most important drugs. The plants have simple leaves, regular flowers and berry-like or capsular fruits.

NUX VOMICA

(nŭks vŏm′ĭ-kȧ)

NUX VOMICA—U.S.P.

Synonyms: Quaker Buttons; Bachelor Buttons; Dog Buttons; Dog Poison; Poison Nut; Crow Fig; Ratsbane.

Source: Strychnos Nux-vomica Linné (Fam. Loganiaceæ).

Etymology: Strychnos is the Gr. equivalent of *nightshade*, which in the Lat. is called "*solanum*." The term was formerly used to designate a number of plants.

Nux-vomica from the Lat. "nux," *nut*, and "vomere," *to vomit*, referring to the action sometimes elicited by very large doses.

Loganiaceæ, named for James Logan, an Irish botanist, secretary to William Penn.

Part Used: The dried, ripe seeds, which are required by the pharmacopœia to yield not less than 2.5 per cent of alkaloids.

Description and Physical Properties: *Unground Nux Vomica:* Seed orbicular, nearly flat, occasionally somewhat bent, from 10 to 30 mm. in diameter, and from 4 to 5 mm. in thickness; externally grayish or greenish gray, covered with appressed hairs, giving it a silky luster; hilum indicated by a circular scar at the center of one of the flattened sides, and connected with the micropyle by a ridge; very hard when dry; internally showing a thin and hairy seed-coat and a large, grayish-white endosperm at one end of which is embedded a small embryo with two broadly ovate, 5- to 7-nerved cotyledons; inodorous; taste intensely and persistently bitter.

Habitat: India (Hindustan, Malabar), Ceylon, Java.

Discussion: The plant yielding this drug is a tree 20 to 40 feet high resembling the dogwood. The small, white, funnel-shaped flowers occur in terminal corymbs. The fruit is a berry about the size and shape of a small orange, but has a smooth, hard, brittle rind. It is green in color at first, but ripens to a rich orange-yellow. The fruit

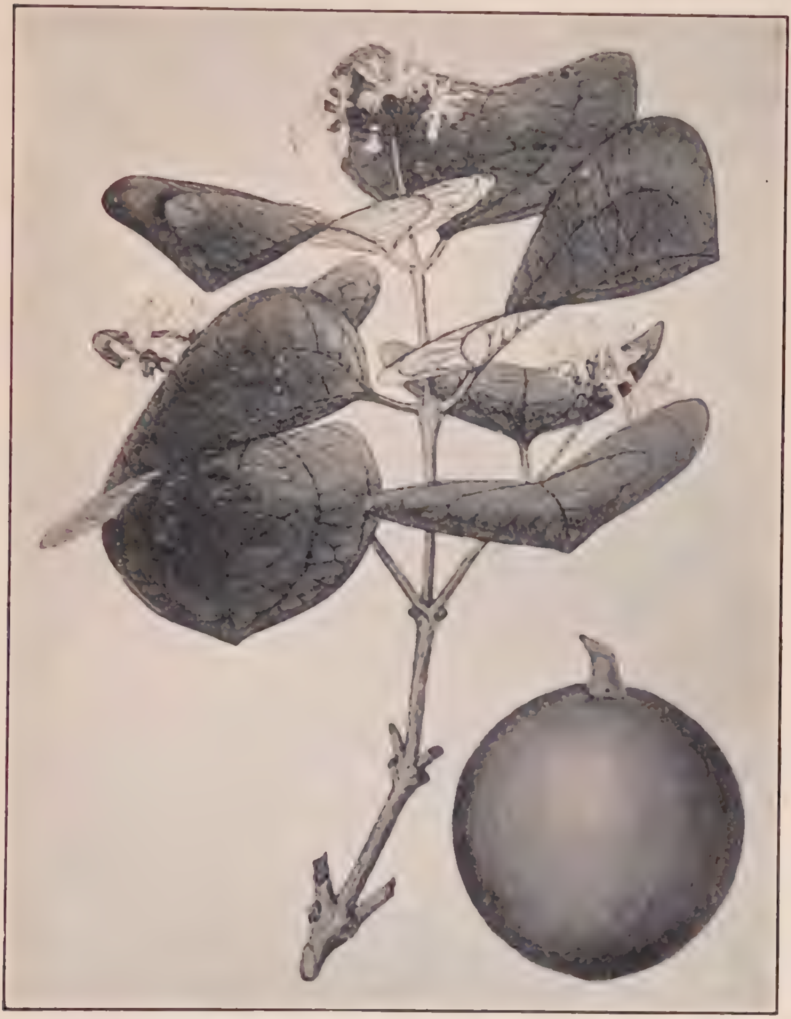


Fig. 85.—Nux Vomica, branch and fruit. The latter contains the seeds. (Courtesy of Parke, Davis & Company.)

contains from one to five brownish, button-shaped seeds embedded in a juicy pulp.

The seeds are removed, washed free of pulp and dried in the sun. The best seeds may sometimes be recognized by a light color, ample breadth, thin edge, pronounced silkiness and prominent hilum. The only safe criterion of quality is the assay. The seeds may be easily powdered by breaking into small pieces and drying several days in hot air or carefully applied direct heat. There are four commercial varieties, valued in the following order:

1. Bombay Nux-vomica.
2. Cochin (Calcutta) Nux-vomica.
3. Ceylon Nux-vomica.
4. Madras Nux-vomica.

The importation of nux-vomica for the year 1925 amounted to 1,488,126 pounds.

Constituents: Strychnine, $C_{21}H_{22}N_2O_2$, an alkaloid, found also in other plants of the family. It was discovered by Pelletier and Caventou in 1818. It is a very bitter substance, its taste being recognizable in a dilution of one part in seven hundred thousand; brucine, $C_{23}H_{26}N_2O_4 + 4H_2O$, an alkaloid, named for James Bruce, a Scotch traveler; loganin, a bitter glucoside; igasuric acid, identical with caffeo-tannic acid.

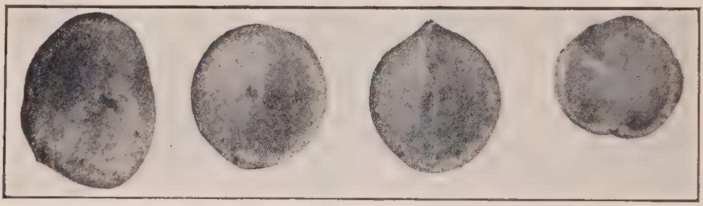


Fig. 86.—Nux Vomica. The one at the right is split open and shows the inner surface.

Properties and Uses: On account of its strychnine content, nux vomica is a bitter stomachic tonic and general nerve stimulant. Given in small doses it increases the secretion of the gastric juice, stimulates the appetite and promotes digestion. It is used in a number of conditions; atonic dyspepsia, atony of the bowel, and general debility being among the more common.

Strychnine is readily absorbed into the blood, but slowly excreted. Thus it is cumulative and dangerous quantities may be stored up within a short time by taking ordinary doses if the frequency of administration exceeds the rate of excretion. Strychnine is antidotal to poisoning by chloral hydrate, morphine and physostigmine. Ordinarily the minimum fatal dose of strychnine may be said to be about one-half grain, although smaller amounts have been known to cause death.

One of the most marked effects of strychnine is its stimulant action upon the central nervous system for which reason it is much used in various forms of paralysis provided there be no lesion of the spinal cord. It is also a valuable respiratory stimulant, quickening and deepening the respiration, and has been used with success in treating cases of respiratory failure resulting from anæsthesia. Strychnine has improved the vision of persons afflicted with amblyopia and amaurosis unassociated with atrophy of the optic nerve. Both nux vomica and strychnine increase the force of the pulse-beat and pulse-rate and slightly raise the blood pressure. Another valuable property of strychnine is its ability to revive persons from the most serious sinking attacks. In such cases prompt action is necessary and the drug should be administered hypodermically.

Brucine has much the same properties as strychnine but is only about 1/50 to 1/60 as active.

Antidotes for poisoning by nux vomica or strychnine are: Absolute quiet; removal of the poison by the stomach pump before the onset of convulsions; or the use of chemical antidotes that form insoluble compounds, as tannic acid, iodine in dilute solution, also potassium permanganate which oxidizes the alkaloid; these to be followed by the removal of the stomach contents by means of the stomach pump or tube. If convulsions have set in they may be controlled by the cautious inhalation of chloroform or ether.

Dose: 1½ gr. (0.1 Gm.).

Official Preparations: U.S.P. X.

Extract of Nux Vomica, ¼ gr. (0.015 Gm.).
Tincture of Nux Vomica, 15 m. (1 cc.).

GELSEMIUM

(jĕl-sē′mĭ-ŭm)

GELSEMIUM—N.F.

Synonyms: Yellow Jasmine; Wild Jasmine; Carolina Jasmine; Wild Woodbine; Evening Trumpet Flower; Yellow Trumpet Flower; Yellow Jasmine Root.

Source: Gelsemium sempervirens (Linné) Persoon (Fam. Loganiaceæ).

Etymology: Gelsemium is the ancient name of the jasmine and is derived from the Arabic "yasmin," the name of the plant.

Sempervirens from the Lat. "semper," *always*, and "virens," from "vivere," *to be green*, referring to the evergreen leaves.

Jasmine, or jasmin, also from the Arabic "yasmin," the name of the plant.

PART USED: The dried rhizome and roots.

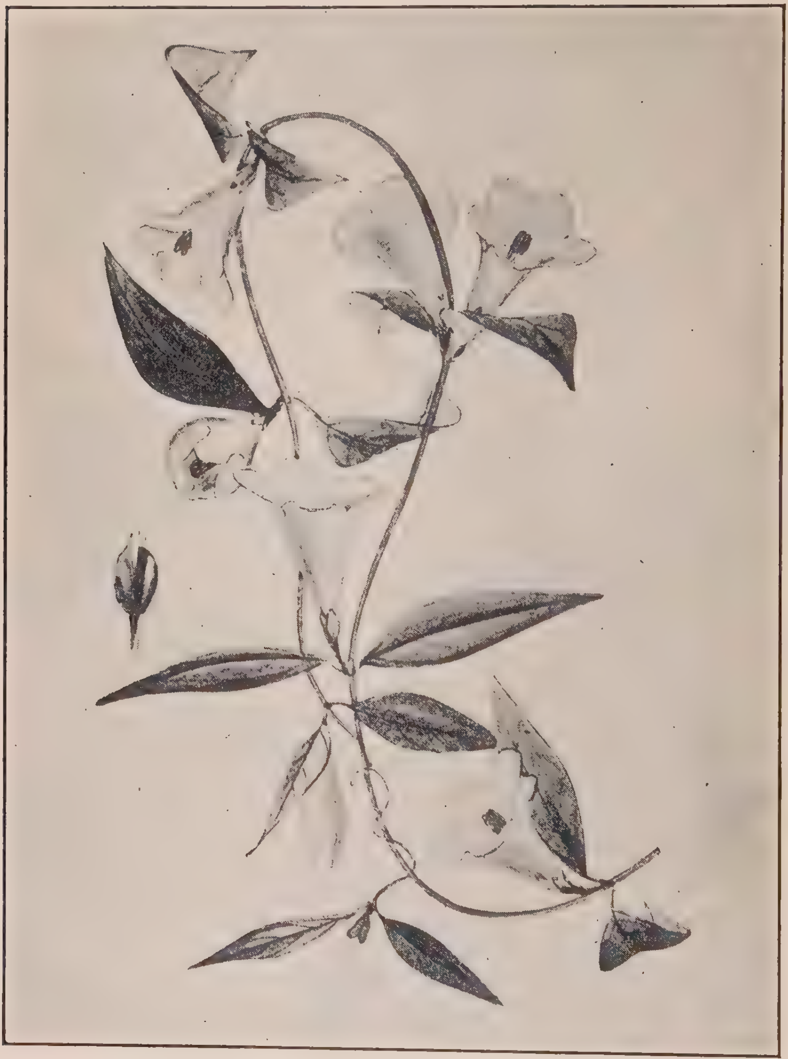


FIG. 87.—Gelsemium. Part of the climbing vine with flowers. (Courtesy of Parke, Davis & Company.)

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Gelsemium:* Rhizome cylindrical, usually in pieces from 3 to 20 cm. in length and from 3 to 30 mm. in diameter; externally light yellowish brown, longitudinally wrinkled, with purplish brown longitudinal lines and transverse fissures; the upper surface with a few stem scars; fracture tough, splintery, internally light brown or pale yellow, bark thin, wood distinctly radiate, excentric, pith disintegrated. Roots light brown, fracture one-half transverse, the other oblique or splintery. Odor slight; taste bitter.

HABITAT: Southern United States from Virginia to Florida.

DISCUSSION: This is a climbing vine of immense size growing in the rich, moist woodlands of several of the Southern States where it ascends the most lofty trees and forms graceful festoons from one tree to another. During the spring its profusion of yellow trumpet-shaped flowers, which are delightfully fragrant, and its dark-green leaves, make it one of the most beautiful of our southern plants.

CONSTITUENTS: Gelsemine and gelseminine, both alkaloids; gelseminic acid.

PROPERTIES AND USES: Gelsemium is a nerve sedative and antispasmodic, resembling coniine and nicotine in its action. It has been used in neuralgic conditions. It has mydriatic properties but is not used for that purpose because it causes redness and some pain.

DOSE: ½ gr. (0.03 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Elixir of Sodium Salicylate, 1 fl. dr. (4 cc.).
Fluidextract of Gelsemium, ½ m. (0.03 cc.).
Tincture of Gelsemium, 4 m. (0.25 cc.).

SPIGELIA

(spī-jē′lĭ-ȧ)

SPIGELIA—U.S.P. IX

SYNONYMS: Pinkroot; Maryland Pink; Carolina Pink; Indian Pink; Starbloom; Wormgrass; Wormseed; American Wormroot.

SOURCE: Spigelia marilandica Linné (Fam. Loganiaceæ).

ETYMOLOGY: Spigelia, given in honor of Adrian van der Spiegel, known as "*Spigelius*," a Flemish botanist and physician (1558–1625). He was Professor of Anatomy and Surgery at Padua. He first gave directions for the preparation of an herbarium.

Marilandica refers, of course, to the habitat, i.e., Maryland.

PART USED: The dried rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: Rhizome horizontal or slightly oblique, more or less flexuous, somewhat branched, from 1.5 to 5 cm. in length and from 2 to 5 mm. in diameter; externally dark brown, slightly annulate, with scars of bud scales, the upper surface knotty from approximate stem-bases, bearing cup-shaped scars; from the lower and lateral portions arise numerous, long, rather coarse, sparingly branched, brittle roots; fracture short, internally differentiated into three nearly equal zones of pith, wood and bark; odor slightly aromatic; taste bitter, pungent.

Few, if any of the roots exhibit then, terminal portions with the bark stripped from the slender strands of wood.

Stems usually attached to the upper portion of the rhizome, nearly cylindrical, attaining a length of 6 cm. and a diameter of 3 mm., light grayish-brown to purplish-brown, nodes annulate, marked by opposite leaf-scars.

Habitat: United States from Maryland to Florida and westward as far as Wisconsin and Texas.

Discussion: This is an herbaceous, perennial plant flourishing in rich soil. It has several erect, four-sided stems growing from 12 to 20 inches in height. Each stem terminates in a one-sided spike and bears several funnel-shaped flowers which are of a rich carmine color externally, and a golden-yellow within. The Creek and Cherokee Indians formerly collected large quantities of this plant in Georgia. They pulled up the entire plants and made them into bales of from 300 to 350 pounds each.

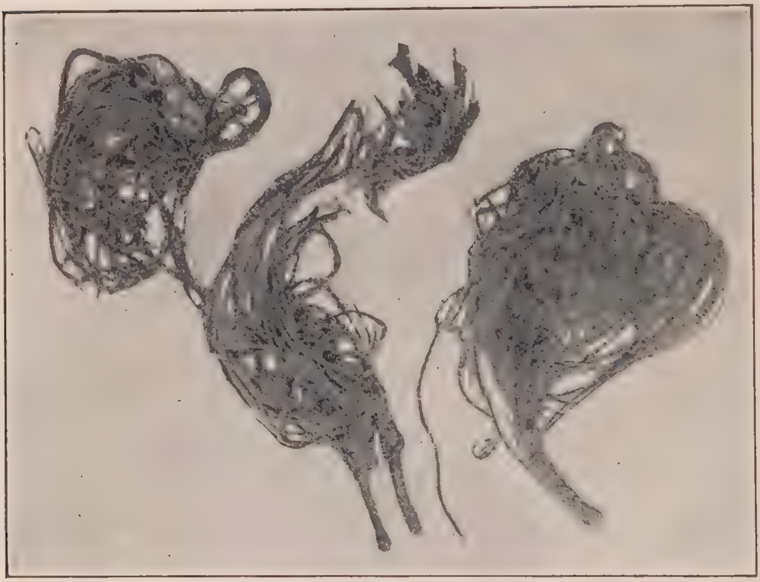


Fig. 88.—Spigelia.

Constituents: Spigeline, a volatile alkaloid; resin; volatile oil; tannin.

Properties and Uses: Spigelia is a safe and very reliable anthelmintic against the roundworm (Ascaris lumbricoides). It should be followed by a rapidly acting purge as Epsom salt to remove the worm after it has been narcotized by the spigelia.

DOSE: 60 gr. (4 Gm.).

IGNATIA

(ĭg-nā′shĭ-ȧ)

IGNATIA—N.F.

SYNONYMS: Saint Ignatius Bean; Ignatia Amara.

SOURCE: Strychnos Ignatii Bergius (Fam. Loganiaçeæ).

ETYMOLOGY: Ignatia, in honor of Ignatius de Loyola (1491–1556), founder of the Society of Jesus.

Amara from the Lat. "amarus," *bitter*, referring to the taste.

Strychnos from the Gr. "strychnos" meaning *nightshade*, the equivalent of the Lat. "*solanum*."

PART USED: The dried, ripe seed yielding not less than 2 per cent of the alkaloids of ignatia.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Ignatia:* Angularly ovate with obtuse angles or irregularly several sided; up to 30 mm. in length and about 15 mm. in breadth and thickness; externally grayish and reddish brown to dark reddish brown or blackish, nearly smooth and with but few hairs; heavy and very hard; fracture granular; translucent in small fragments; a small irregular cavity in the center contains the small embryo. Nearly inodorous and intensely bitter.

HABITAT: Philippine Islands.

DISCUSSION: The plant producing this drug is a woody, climbing vine closely related to the nux vomica. The seeds are quite irregular in shape and present a pebble-like appearance. They vary from a grayish- to a brownish-black in color and are about an inch in length.

CONSTITUENTS: Alkaloids, about 2 per cent, of which from one-third to two-thirds is strychnine, the remainder is brucine.

PROPERTIES AND USES: The properties and uses of ignatia are in every respect similar to those of nux vomica. It is not used extensively in medicine.

DOSE: 1½ gr. (0.1 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Extract of Ignatia, ½ gr. (0.03 Gm.).

Tincture of Ignatia, 10 m. (0.6 cc.).

CHAPTER LXVIII

APOCYNACEÆ

(ȧ-pŏs′ĭ-nā′sḗ-ē)

DOGBANE FAMILY

This is a widely distributed family numbering 130 genera and about 1100 species. They consist of herbs, shrubs and trees and occur for the most part in the tropics. The leaves are usually opposite, the flowers regular and the fruit either a follicle or a drupe. A common characteristic of the family is the laticiferous system containing milky or acrid juice.

STROPHANTHUS

(strṓ-făn′thŭs)

STROPHANTHUS—U.S.P.

Synonym: Strophanthus Seed.

Source: Strophanthus Kombe Oliver or Strophanthus hispidus De Candolle (Fam. Apocynaceæ).

Etymology: Strophanthus from the Gr. "strophe," *turning*, from "strephein," *to turn* or *twist*, and "anthos," *a flower*, referring to the twisted lobes of the corolla.

Kombe, after the town of that name which is located in the Gaboon district of Africa.

Hispidus, the Lat. for *hairy* or *bristly*, referring to the long coarse hairs covering the seeds.

Apocynaceæ from the Gr. "apo," *from* or *away*, and "kyon," *a dog*, i.e., it drives away or destroys dogs, hence its common name *dogbane*.

Part Used: The dried, ripe seed deprived of the awns.

Description and Physical Properties: *Unground Strophanthus Kombe:* Oblong-lanceolate, flattened and obtusely edged; from 8 to 25 mm. in length, from 2.5 to 5 mm. in width, and from 0.5 to 2 mm. in thickness; the raphe ridge extending from near the center of one side to the apex; light brown with a distinct greenish tinge; silky lustrous owing to a dense coat of closely appressed hairs; fractured surface whitish and oily; taste very bitter.

Unground Strophanthus hispidus: Light to dark brown; otherwise resembling *S. Kombe* excepting that it is smaller and with fewer and smaller hairs.

HABITAT: Central Africa (Kombe, Guinea, Senegambia), Asia, Philippine Islands.

DISCUSSION: There are about thirty recognized species of Strophanthus, but only a few of them are poisonous or of medicinal value.

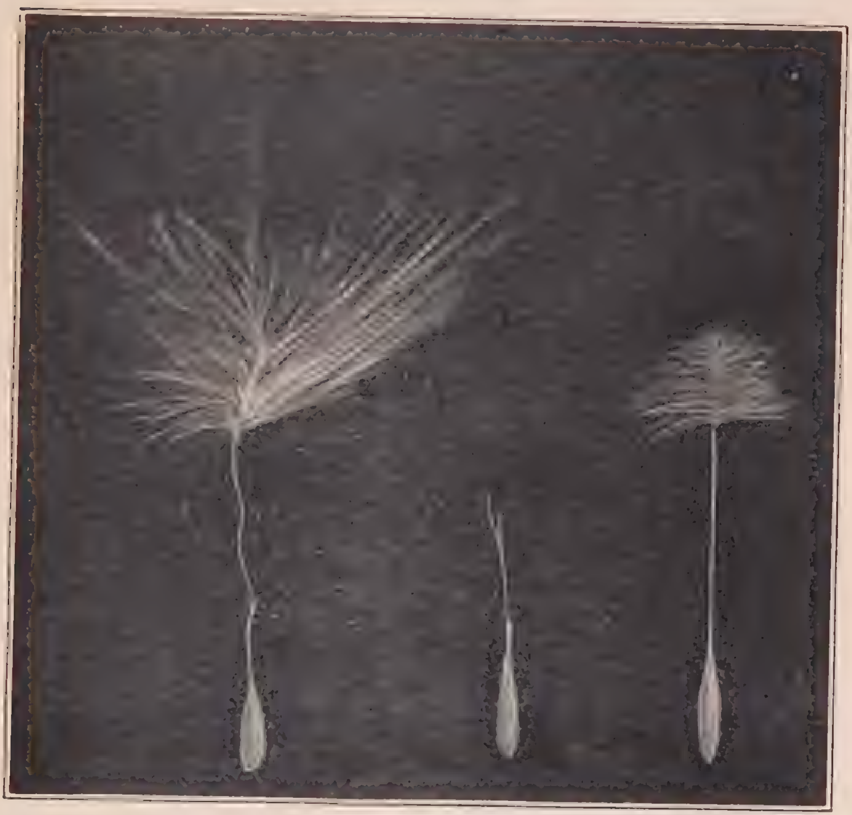


FIG. 89.—Strophanthus Kombe. Seeds with awns attached.

They are woody climbers with stems several inches in thickness. They climb to the tops of the highest trees and hang in festoons between branches or drop in coils upon the ground. Collection of the fruit is made by the natives who peel off the husks, leaving the smooth yellowish-brown, inner covering enclosing the seeds.

The commercial drug sometimes contains the seeds from the non-medicinal species as an admixture. Therefore the importer must exercise due caution in accepting shipments until after a biological assay has been made. The fruit is a long pod or pair of follicles filled with seeds, each of which bears a slender style terminating in a long, feathery awn. This awn consists of long, fine hairs and is very serviceable for the dispersion of the seed through the agency of the wind. The seeds of several of the poisonous species are used by the native tribes of Africa for making arrow poison. In the Gaboon district this poison is called "*inee*" or "*onaye*." In the Manganja country it is called "*kombe*." The natives are very reluctant to disclose the composition or method of preparation of these poisons. Animals wounded with arrows treated with these products seldom move more than a few hundred feet before paralysis of the muscles overcomes them, but their flesh produces no ill effects when eaten.

Constituents: Strophanthin, a glucoside or mixture of glucosides, 1 to 3 per cent; kombic acid.

Properties and Uses: Strophanthus is a heart tonic and diuretic, similar in its action to digitalis but apparently less potent and less reliable. It stimulates the cardiac muscle, strengthening the force of the beat, but slowing its rate. It increases the blood pressure less than does digitalis. This prolongs the diastole without changing the duration of the systole and results in restoring an irregular heart to a regular rhythmic beat with a greater efficiency. It acts more quickly than digitalis, but its action is less enduring; hence there is no cumulative effect. The increased efficiency of the heart causes an increase in the renal circulation and therefore causes a diuresis. Thus strophanthus is used in palpitation, weak heart, muscular failure, cardiac dropsy, valvular lesion, rapid heart, a tendency to fainting spells and chronic Bright's disease. The effects of strophanthus will be noticeable within about thirty minutes and will usually last for several hours, lowering the pulse rate from ten to twenty beats per minute, but increasing the force and efficiency of the heart. Large over-doses paralyze the heart.

Dose: 1 gr. (0.06 Gm.).

Official Preparation: U.S.P. X.

Tincture of Strophanthus, 8 m. (0.5 cc.).

APOCYNUM

(ȧ-pŏs′ĭ-nŭm)

APOCYNUM—N.F.

Synonyms: Canadian Hemp; Black Indian Hemp; American Hemp; Bowman's Root; Wild Cotton; Indian Physic; Milk Weed; Rheumatism Weed.

Source: Apocynum cannabinum Linné (Fam. Apocynaceæ).

Etymology: Apocynum from the Gr. "apo," *away* or *from*, and "kyon," *a dog*, because of its use in destroying or driving away dogs.

Cannabinum from the Gr. "kannabis," *hemp*, from the Arabic "ganah," or the Celtic "can," *a reed*, and "ab," *small*, referring to the long, slender stems.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Apocynum:* Cylindrical, somewhat branched, of varying length, 3 to 10 mm. thick, externally reddish brown to grayish brown; longitudinally wrinkled, occasionally with transverse fissures having vertical sides extending through the bark; fracture short; internal bark light brown, 1.5 to 3 mm. thick; wood radiate and with large tracheæ; pith small, in rhizome pieces only. Almost inodorous; taste starchy, afterwards becoming bitter and somewhat acrid.

Habitat: United States and Canada.

Discussion: This is a small, perennial, herbaceous plant growing along the roadsides and the borders of woods in many localities of this country and Canada. It is closely related to the milkweed family, and, like the plants of that family, contains a milky juice. The bark is tough and fibrous and, by proper manipulation, affords a substitute for hemp; hence the common names.

Constituents: According to more recently published researches, cymarin or apocynamarin, $C_{30}H_{44}O_9 \cdot \frac{1}{2}H_2O$, a lactone, represents the activity of the drug.

Properties and Uses: Apocynum is a heart tonic and diuretic, somewhat resembling digitalis in its action, and is employed in cardiac and renal dropsy. In many cases it exhibits irritant properties causing vomiting and purging. It is less dependable than digitalis.

Dose: 12 gr. (0.75 Gm.).

Official Preparation: N.F. V.

Fluidextract of Apocynum, 12 m. (0.75 cc.).

CHAPTER LXIX

CONVOLVULACEÆ

(kŏn-vŏl′vū̇-lā′sē̇-ē)

MORNING-GLORY FAMILY

This is a large family of twining vines, erect herbs, shrubs, or even trees, numbering 40 genera and about 900 species. They are of wide distribution, but occur for the most part in the tropics. They have alternate leaves and regular pentamerous flowers. Several species, as the sweet potato and the common morning-glory, are widely cultivated in the United States.

(*a*) JALAPA

(jă-lä̇′pȧ)

JALAP—U.S.P.

(*b*) RESINA JALAPÆ

(rĕ̇z-ī′nȧ jă-lăp′ē)

RESIN OF JALAP—U.S.P.

Synonyms: (*a*) Vera Cruz Jalap; True Jalap.

Source: Exogonium Jalapa (Nuttall et Coxe) Baillon (Fam. Convolvulaceæ).

Etymology: Jalapa from "Jalapa," formerly "Xalapa," a city in the State of Vera Cruz, Mexico, from which the drug is exported.

Exogonium from the Gr. "exo," *outside*, and "gonos," *offspring*, i.e., the stamens and pistils are exserted.

Convolvulaceæ from the Lat. "convolvere," *to roll together, to entwine*, i.e., referring to the twining habit of the stem.

Part Used: (*a*) The dried, tuberous root which must yield not less than 7 per cent of total resin.

(*b*) The resin obtained from the root.

Description and Physical Properties: (*a*) *Unground Jalap:* Fusiform, irregularly ovoid or pyriform, the larger roots often incised or cut into pieces; from 4 to 15 cm. in length and from 1 to 10 cm. in diameter; externally dark brown, longitudinally wrinkled or furrowed and with numerous lenticels; hard, compact, not fibrous, internally light grayish brown to dark brown, with a distinct brown cambium line; odor slight but distinctive and smoky; taste somewhat sweet and acrid.

(*b*) Yellow to brown masses or fragments, breaking with a resinous, glassy fracture and translucent at the edges, or a yellowish-gray to yellowish-brown powder. It has a slight, peculiar odor, a somewhat acrid taste, and is permanent in the air.

Resin of Jalap is soluble in alcohol in all proportions; insoluble in carbon disulphide, benzene, and in fixed or volatile oils.

HABITAT: Mexico. Cultivated in India and Jamaica.

DISCUSSION: The plant producing this drug is a perennial twining vine, very similar in appearance to our common morning-glory. It grows in the rich, shady woods of Eastern Mexico on the eastern slope of the Mexican Andes and especially in the State of Vera Cruz, at an elevation of from 1500 to 2400 meters above sea-level. In India and Jamaica it is trained upon trellises and other supports. It is left undisturbed for the first three years, but collection is made every third year thereafter.

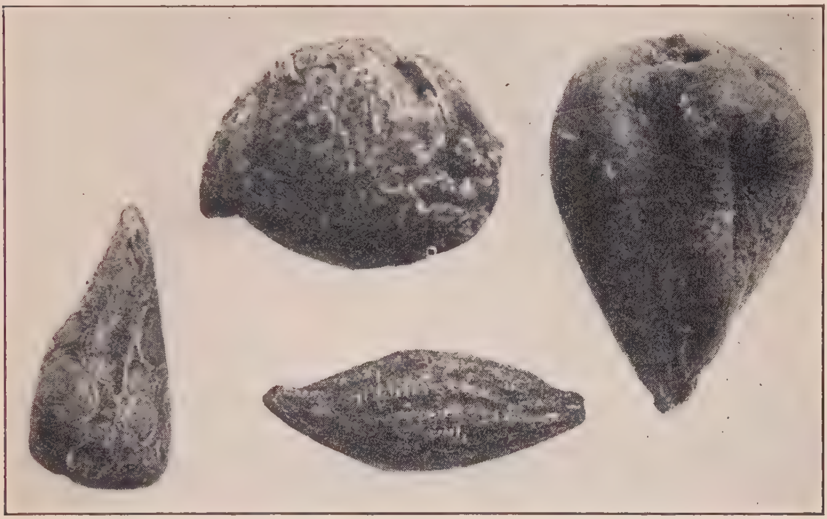


FIG. 90.—Jalap.

The flowers are funnel-shaped, of a lilac-purple color and about 2 inches in diameter. The root is tuberous or pear-shaped and from 1 to 5 or 6 inches in diameter. They should be collected either in autumn, after the over-ground portion of the plant has died down, or in early spring just as the new sprouts are beginning to appear. As a matter of fact, however, they are collected throughout the year, which accounts for the great variability in the strength of the commercial drug.

This part of Mexico is noted for its abundance of rainfall; consequently the drying of the drug must be done artificially and is accomplished over the primitive hearths of the native huts, and in anything but a uniform manner. The larger roots sometimes are sliced longitudinally into quarters, or are merely incised, to facilitate drying. On account of the abundance of starch present, the root is prone to attack by insects. 104,179 pounds of jalap were imported in 1924.

Constituents: (*a*) A complex resin ("convolvulin" and "jalapin"?), 7 to 15, or even as high as 22 per cent; starch; gum; sugar.

Properties and Uses: Jalap is an active hydragogue purgative, producing its action in from four to six hours. It does not increase the flow of the bile, but unites with the bile already present in the duodenum to form a very purgative compound which stimulates the intestinal secretions and the peristaltic action of the bowel. On account of the watery nature of the stools and the diuresis produced, jalap is used wherever a diuretic action is required, as in dropsy, apoplexy, threatened apoplexy, etc. to lower the blood pressure. It is also used in constipation and febrile conditions. It is often combined with anthelmintic remedies since it is in itself very obnoxious to entozoa and aids in their expulsion.

Dose: (*a*) Jalap root: 15 gr. (1 Gm.).
(*b*) Jalap resin: 2 gr. (0.125 Gm.).

Official Preparations: U.S.P. X.
(*a*) Jalap root:
Compound Powder of Jalap, 30 gr. (2 Gm.).
(*b*) Jalap resin:
Compound Pills of Mild Mercurous Chloride, 2 pills.

IPOMŒA

(ī′pŏ-mē′ȧ)

IPOMEA—U.S.P.

Synonyms: Mexican Scammony Root; Orizaba Jalap Root; Male Jalap.

Source: Ipomœa orizabensis Ledenois (Fam. Convolvulaceæ).

Etymology: Ipomœa from the Gr. "ips, ipos," *a kind of worm*, and "omoios," *like*, referring to the climbing habit of the plant.

Orizabensis, named for the City of Orizaba in the State of Vera Cruz, Mexico.

Part Used: The dried root which must yield not less than 15 per cent of total resins.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Ipomea:* Nearly flat transverse slices, from 2 to 12 cm. in diameter, and from 1 to 5.5 cm. in thickness; externally light to dark brown, very deeply wrinkled; fracture tough, fibrous; cut surface light brown, showing concentric rings from which coarse fibers protrude; odor distinct, somewhat aromatic; taste slightly sweet, becoming somewhat acrid.

HABITAT: Eastern Mexico.

DISCUSSION: This is a climbing vine, similar in its general appearance to the common morning glory. The flowers are funnel-shaped and of a reddish-purple color. The root is yellow, externally, but milky-white within and grows from 15 to 20 inches in length and from 1 to 5 inches in thickness. It reaches the market in the form of flat disks resulting from transversely slicing the root. These slices are from ½ to ¾ inch in thickness from the larger roots and from 2 to 3 inches in thickness from the smaller ones. Sometimes the roots are sliced longitudinally. The transversely sliced roots show concentric rings from which coarse fibers protrude on both surfaces. Ipomea in reality replaces Levant scammony root used in this and other countries for many years but no longer commercially available.

CONSTITUENTS: Resin, 6 to 22 per cent.

PROPERTIES AND USES: Ipomea is a purgative, very similar in its action to jalap and scammony, but possibly a little less drastic. It is employed for the same variety of conditions as scammony.

OFFICIAL PREPARATIONS: U.S.P. X.

Resin of Ipomea, 3 gr. (0.2 Gm.).

Compound Extract of Colocynth, 4 gr. (0.25 Gm.).

SCAMMONIÆ RADIX

(skă-mō′nĭ-ī rā′dĭx)

SCAMMONY ROOT—U.S.P. IX

SOURCE: Convolvulus Scammonia Linné (Fam. Convolvulaceæ).

ETYMOLOGY: Scammony from the Gr. "scammonia" from "scamma," signifying *a substance unearthed or dug out of the ground,* i.e., the substance obtained from the root.

Convolvulus from the Lat. "convolvere," *to roll together, to entwine,* referring to the climbing habit of the plant.

PART USED: The dried root yielding not less than 8 per cent of total resins of scammony root.

DESCRIPTION AND PHYSICAL PROPERTIES: Cylindrical or somewhat tapering, from 10 to 25 cm. in length and from 1 to 4.5 cm. in thickness; externally grayish to reddish brown; usually distinctly twisted, deeply longitudinally furrowed, marked by distinct root-scars, otherwise nearly smooth except for the lenticels and abraded cork, the upper portion terminated usually by a number of short stem branches; hard and heavy; fracture tough, irregular with projecting wood-fibers; internally somewhat mottled, showing yellowish, porous wood-wedges separated by whitish parenchyma containing starch and resin, bark thin; odor slight, resembling that of jalap; taste very slightly sweet, becoming slightly acrid.

HABITAT: Asia Minor, Greece, Syria, Anatolia.

DISCUSSION: This plant is a perennial, twining vine with a stout taproot some 3 or 4 feet in length and as many inches in diameter. It has several, slender, twining stems extending, sometimes, 15 or 20 feet along the ground, or climbing upon neighboring plants. The leaves are arrow-shaped, bright-green in color, and stand alternately upon long footstalks. The plant is richest in resin just before the flowering season, at which time the root should be dug, properly prepared and dried for the market.

The method of collecting the exudation, which was official under the title of "*scammonia*," from 1820 to 1910, but which is hardly an article of commerce any more, was about the same in all localities. The soil was removed from around the root so as to leave about 4 or 5 inches of the root exposed. The top was then cut off in a slanting direction about 2 inches below the crown. The juice began to exude at once and was collected in mussel shells stuck into the root below the cut surface. Collection was made in the evening and the cut surface of the root freshened so as to increase the flow. The contents of the shells and the scrapings from the cut surface of the root were transferred to a copper vessel, or sometimes a leather bag, and carried home to dry. The product was often basely adulterated by the natives who added foreign matter while it was still soft. Carbonate of lime, flour, wood ashes, earth, etc., are some of the articles which have been found in the commercial drug. For this reason the whole drug was imported and the resin manufactured here by extraction with alcohol. Scammony was known to the Greeks, Romans and Arabians and was employed as a purgative by them from very early times. In 1924, 21,378 pounds of scammony root were imported. Because of the small amounts available it practically has passed out of use.

CONSTITUENTS: Resin, 3 to 10 per cent; tannin, 3 per cent; sugar, 15 per cent; starch.

PROPERTIES AND USES: Scammony is an active, irritant, hydragogue cathartic, somewhat similar in its action to jalap. It is more irritant than jalap and causes considerable griping. To avoid this condition it may be combined with other cathartics, such as calomel, colocynth, potassium sulphate, and the aromatic correctives.

DOSE: 4 gr. (0.25 Gm.).

CHAPTER LXX

HYDROPHYLLACEÆ

(hī′drō̇-fĭ-lā′sē̇-ē)

WATERLEAF FAMILY

This family numbers about 17 genera and 160 species which are found mostly in the western part of North America. The family name comes from the Gr. "hudor," *water,* and "phyllon," *leaf,* from the ancient supposition that each leaf possessed a cavity for storing water. They have opposite leaves, regular flowers and capsular fruits. The family consists of herbs, shrubs and small trees and are distinguished by the leaves which are hairy, juicy and pinnately compound.

ERIODICTYON

(ĕr′ĭ-ō̇-dĭk′tĭ-ŏn)

ERIODICTYON—U.S.P.

Synonyms: Yerba Santa; Mountain Balm; Consumptive's Weed; Bear's Weed; Tarweed; Gum Plant; Gum Bush.

Source: Eriodictyon californicum (Hooker et Arnott) Bentham et Torrey (Fam. Hydrophyllaceæ).

Etymology: Eriodictyon from the Gr. "erion," *wool,* and "diktyon," *a net,* referring to the wooly, net-veined leaves.

Californicum from California, i.e., the habitat.

Yerba Santa from the Sp. "yerba," *a plant* or *herb,* and "santa," *holy* or *sacred,* referring to its supposedly divinely contributed curative properties.

Part Used: The dried leaf.

Description and Physical Properties: *Unground Eriodictyon:* Usually in fragments; when entire, lanceolate, from 5 to 15 cm. in length and from 1 to 3 cm. in breadth; apex acute; base slightly tapering into a short petiole; margin irregularly serrate or crenate-dentate; upper surface yellowish-brown, covered with a more or less glistening resin; under surface grayish or yellowish white, conspicuously reticulate with greenish-yellow veins and minutely tomentose between the reticulations; thick, brittle; odor aromatic; taste balsamic, bitter, becoming sweetish.

Habitat: California, New Mexico.

Discussion: This is a low, evergreen shrub with smooth, resinous leaves from 3 to 6 inches in length and small, funnel-shaped flowers. It grows abundantly in the dry rocky hills of the afore-named states and presents a striking appearance because of the shiny, resinous coating on all green parts of the plant.

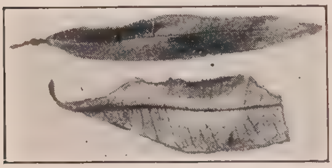


Fig. 91.—Eriodictyon. $\frac{1}{3}$ size.

Constituents: Acrid, bitter resin, 8 per cent; volatile oil, 1 per cent· tannic acid.

Properties and Uses: Eriodictyon is a stimulating expectorant and is used in asthma and bronchitis for this action. It possesses some value as a bitter tonic and is often employed to mask the taste of quinine.

Dose: 15 gr. (1 Gm.).

Official Preparation: U.S.P. X.

Fluidextract of Eriodictyon, 15 m. (1 cc.).

CHAPTER LXXI

SOLANACEÆ
(sŏl′ȧ-nā′sē̇-ē)

NIGHTSHADE FAMILY

THIS is a family of strong-scented, often narcotic herbs, shrubs and trees, comprising about 75 genera and 1800 species. They are of wide distribution, but are most abundant in tropical countries. They have alternate leaves and often showy flowers with five stamens and a 2-celled ovary, the cells containing many ovules.

(*a*) BELLADONNÆ FOLIA
(bĕl′ȧ-dŏn′nē fō′lĭ-ȧ)

BELLADONNA LEAVES—U.S.P.

(*b*) BELLADONNÆ RADIX
(bĕl′ȧ-dŏn′nē rā′dĭx)

BELLADONNA ROOT—U.S.P.

SYNONYMS: Deadly Nightshade; Sleeping Nightshade; Death's Herb; Banewort; Poison Black Cherry; Doftberry; Mekilwort; Dwale.

SOURCE: Atropa Belladonna Linné (Fam. Solanaceæ).

ETYMOLOGY: Atropa from the Gr. "atropos," from "a," *not*, and "trepein," *to turn*, i.e., inflexible. Atropos, the daughter of Night, was one of the Three Fates in classical mythology whose duty it was to cut the thread of life, thus representing the poisonous nature of the plant.

Belladonna from the It. "bella," *beautiful*, and "donna," *lady*, because the berries were used by Italian women as a cosmetic and to dilate the pupils of the eyes to make them more beautiful.

Solanaceæ, from the Lat. "solanum," *nightshade*, from "sol," *the sun*, so named from the fact that plants of this family dislike the sunlight, preferring the shade.

Part Used: (*a*) The dried leaves and tops containing not less than 0.3 per cent of the alkaloids of belladonna leaves.

(*b*) The dried root yielding not less than 0.45 per cent of the alkaloids of belladonna root.

Description and Physical Properties: (*a*) *Unground Belladonna Leaves:* Usually matted together, crumpled or broken; leaves mostly light green, from 5 to 20 cm. in length, and from 4 to 12 cm. in width, broadly ovate, apex acute, margin entire, narrowed into the petiole, with few hairs, the latter more abundant along the veins, and numerous whitish dots (crystal cells) visible with a lens; stems more or less hollow and flattened, finely hairy when young; flowers with campanulate corolla, yellowish purple, becoming faded, usually subtended by the calyx; fruits nearly globular, green to brown or purplish black with numerous, flattened somewhat reniform seeds, up to 2 mm. in width; odor slight, somewhat tobacco-like when moistened; taste somewhat bitter and acrid.

(*b*) *Unground Belladona Root:* Cylindrical or tapering, sparingly branched, often split longitudinally or broken transversely; from 0.5 to 4 cm. in thickness; light grayish brown externally, nearly white internally; somewhat wrinkled longitudinally and the soft periderm frequently abraded; fracture short, mealy and emitting a puff of dust consisting chiefly of starch grains; nearly odorless when dry, but characteristic when moistened; taste sweetish, then bitterish and acrid.

Habitat: Southern and Central Europe, Asia Minor and Algeria. Cultivated in Germany, France, England and the United States.

Discussion: The deadly nightshade is a perennial, herbaceous plant with several erect, purplish stems growing about 3 feet in height. The plants seem to prefer limestone soil and grow in stony, shady waste places. During the World War belladonna was grown successfully as a field crop on a small commercial scale from Virginia to Michigan and westward. The leaves occur in pairs of unequal size. They are of a dark-green color and are pointed at both ends. The flowers, which occur on solitary peduncles arising from the axils of the leaves, are bell-shaped and of a dull-reddish color. The fruit is a roundish berry with a furrow running lengthwise on each side. It is first green, then red, and finally of a deep-purplish color. The taste of the fruit is sweetish which accounts for so many cases of poisoning by them. All parts of the plant contain the poisonous properties.

The leafing and flowering processes do not seem to exhaust the root of its alkaloids, there being a simultaneous development in the root and leaves. Therefore both the roots and leaves should be collected at the same time. They are usually gathered in May and June during the flowering season. Chemical analysis has shown that about twice as much alkaloid is contained in the root during the flowering and fruiting seasons as in the spring. The importation of belladonna roots and leaves during 1924 amounted to 163,554 pounds.

Constituents: Hyoscyamine, *l*-rotatory, contained in largest amount; atropine; belladonine (amorphous apoatropine), $C_{17}H_{21}NO_2$; scopolamine, $C_{17}H_{21}NO_4 \cdot H_2O$; atropine and hyoscyamine have the same chemical composition, their formula being $C_{17}H_{23}NO_3$. Atropine generally is optically inactive or nearly so and is considered to be a mixture of *d*- and *l*-hyoscyamine. Natural or *l*-hyoscyamine can be converted into atropine.

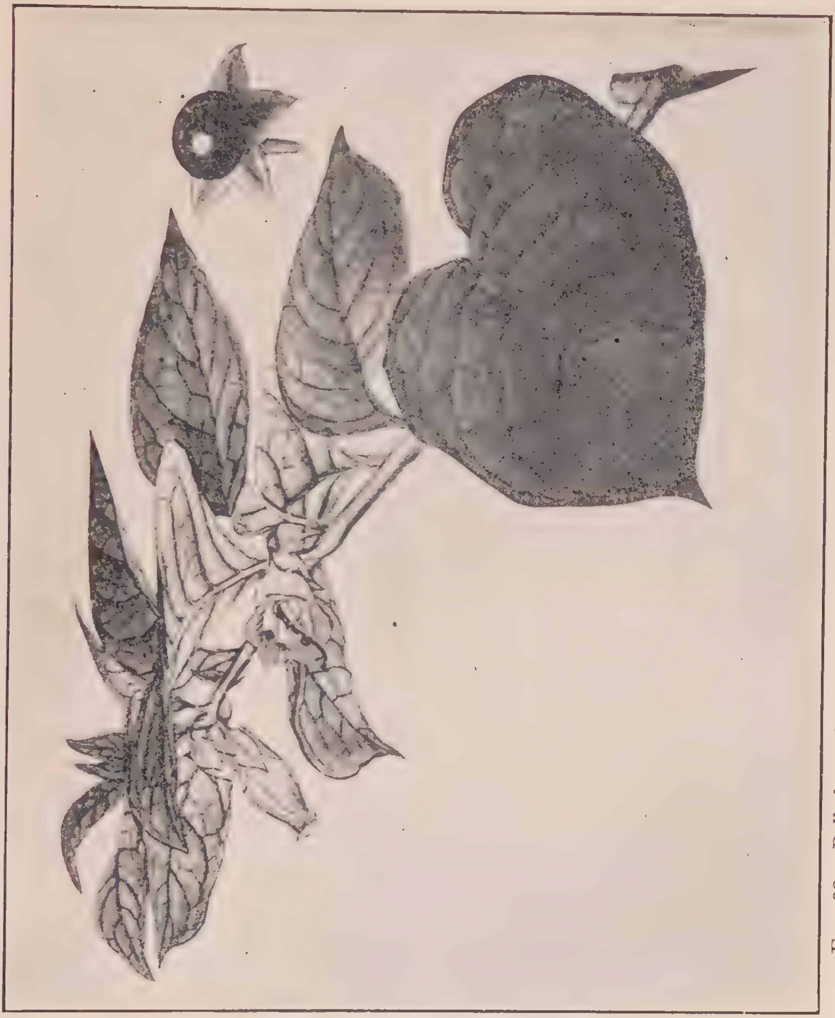


Fig. 92.—Belladonna branch showing leaves. (Courtesy of Parke, Davis & Company.)

Properties and Uses: Belladonna is anodyne, sedative and antispasmodic and is used to lessen the pain of many diseases such as neuralgia, sciatica, gout, rheumatism, menengitis, myelitis, erysipelas, etc. It is used for its antispasmodic effect in whooping cough, asthma and other spasmodic affections of the respiratory tract. Belladonna diminishes most of the secretions, except the urine, which is increased. This diminution of the amount of the secretions is brought about by a paralysis of the peripheral endings of the secretory nerves in the cells. It also increases peristalsis by paralysis of the end organs in the involuntary muscles of the intestinal walls. Its principal alkaloid, atropine, is mydriatic and is used in examination of the eye and to prevent or break up adhesions of the iris or lens. Preparations of belladonna are used locally for their anodyne action on carbuncles, abscesses and painful diseases of the skin. Atropine is antidotal to poisoning by opium, physostigma and prussic acid. Belladonna frequently is combined with irritant purgatives to correct their action.

Dose: (*a*) The leaves: 1 gr. (0.06 Gm.).
(*b*) The root: $\frac{3}{4}$ gr. (0.045 Gm.).

Official Preparations: U.S.P. X.
(*a*) Extract of Belladonna (leaves), $\frac{1}{4}$ gr. (0.015 Gm.).
Powdered Extract of Belladonna (leaves) $\frac{1}{4}$ gr. (0.015 Gm.).
Fluidextract of Belladonna (leaves), 1 m. (0.06 cc.).
Tincture of Belladonna (leaves), 10 m. (0.6 cc.).
(*b*) Fluidextract of Belladonna Root, $\frac{3}{4}$ m. (0.05 cc.).

STRAMONIUM

(strȧ-mō′nĭ-ŭm)

STRAMONIUM—U.S.P.

Synonyms: Jimson Weed; Jamestown Weed; Jamestown Lily; Stink Weed; Devil's Trumpet; Devil's Apple; Thornapple.

Source: Datura Stramonium Linné (Fam. Solanaceæ).

Etymology: Datura from the Arabic "tatorah," or the Hindu "dhatura," the name of the plant. "Datula" is both the Turkish and the Persian name for the plant.

Stramonium from the Gr. "strychnon" (first used by Dioscorides for both belladonna and stramonium), a synonym for the Lat. "solanum," *nightshade*, and "manikon," *raving*, i.e., a solanaceous plant which produces a raving madness.

Part Used: The dried leaves and flowering tops yielding not less than 0.25 per cent of the alkaloids of stramonium.

Description and Physical Properties: *Unground Stramonium:* More or less matted, wrinkled and crushed; leaves petiolate, ovate; apex acuminate, base unequal; margin sinuate, toothed or angled, the teeth few, acute and with rounded sinuses; the lamina usually shows small, circular perforations, surrounded by cork or sometimes filled with cork, surfaces usually sparsely hairy, the hairs mostly upon the veins; upper surface dark green, lower surface light green. Stems often flattened, longitudinally wrinkled, occasionally with one or more deep furrows: light greenish brown to purplish brown. Odor distinct, heavy and narcotic; taste unpleasant and nauseous.

HABITAT: Europe, Asia, North America.

DISCUSSION: This is an annual plant of rank, vigorous growth with a smooth, branching stem from 3 to 6 feet in height. It is found growing in barnyards, rubbish heaps and other waste places near habitations in many parts of the world, but never in the mountains or woods. Gypsies are said to have brought the leaves and seeds to Europe from Asia during the Middle Ages, and to have used the smoke therefrom to intoxicate their dupes.

Stramonium leaves are from 5 to 6 inches in length and spring from the forks of the stems. The flowers are solitary, funnel-shaped and of a creamy white color. The fruit is a dehiscent capsule about the size of a plum and is covered with sharp spines. It contains a large number of seeds resembling, somewhat, those of the onion. All parts of the plant are active, the seeds being more so than the leaves. The leaves should be gathered while the plant is flowering. This is best accomplished by pulling up the entire plant, then quickly removing and drying the leaves. The importation of stramonium leaves during 1924 amounted to 94,968 pounds.

CONSTITUENTS: Hyoscyamine (daturine), 0.2 to 0.4 per cent. It may also contain traces of atropine and scopolamine.

PROPERTIES AND USES: The action of stramonium is very similar to that of belladonna, being anodyne, sedative and antispasmodic. See page 395.

DOSE: 1¼ gr. (0.075 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Extract of Stramonium, ⅓ gr. (0.02 Gm.).
Tincture of Stramonium, 12 m. (0.75 cc.).

HYOSCYAMUS

(hī′ŏ-sī′ȧ-mŭs)

HYOSCYAMUS—U.S.P.

SYNONYMS: Henbane; Black Henbane; Henbell; Stinking Nightshade; Insane Root; Poison Tobacco; Hog Bean.

Source: Hyoscyamus niger Linné (Fam. Solanaceæ).

Etymology: Hyoscyamus from the Gr. "hyos," *hog*, and "kyamos," *bean*. This name, also that of henbane, was given because swine and fowls are poisoned by the plant, while other animals, such as horses, cows, goats and dogs can withstand considerable quantities of it without apparent ill effects.

Niger, the Lat. for *black*, referring to the color of the seeds.

Part Used: The dried leaf, with or without the tops, yielding not less than 0.065 per cent of the alkaloids of hyoscyamus.

Description and Physical Properties: *Unground Hyoscyamus:* Usually much wrinkled, matted and broken, frequently consisting of leaves, stems, and flowering and fruiting tops. Leaves ovate or ovatelanceolate, inequilateral, with petioles up to one-third the length of the blade, or sessile; apex acute, margin coarsely and angularly 1- to 4-toothed or lobed; hairy, densely so on the lower surface; upper surface dark green, lower surface light gray-green; stems from 2 to 7 mm. in thickness, cylindrical or somewhat compressed, longitudinally wrinkled, hairy, gray-green; flowers nearly sessile, with an urn-shaped, hairy, unequally 5-toothed calyx and a campanulate corolla, yellowish with purplish veins; fruit, a 2-locular pyxis enclosed in the calyx; odor distinctive; taste bitter and acrid.

Habitat: Europe and Asia. Naturalized in the United States. Cultivated in England. This plant has become so diversified by cultivation as to show distinct varieties and almost species, all differing somewhat in medicinal strength.

Discussion: Henbane is a biennial plant with an erect, branching stem, several feet in height, arising the second year of its growth. Like stramonium, it is wont to frequent rubbish piles and waste places, especially about old houses and barns. The leaves are large and deeply sinuated, with a base that embraces the stem. Both the leaves and stems are thickly beset with short hairs. Both emit a fetid odor. The funnel-shaped flowers occur in long, terminal, one-sided spikes. The leaves, either whole or in powder, may be distinguished, by the aid of a microscope, from those of belladonna or stramonium, by the greater number of leaf hairs. 67,725 pounds of hyoscyamus were imported during 1924.

Constituents: Hyoscyamine; hyoscipicrin, a neutral, bitter glucoside; possibly a trace of scopolamine and about 2 per cent of potassium nitrate.

Properties and Uses: Hyoscyamus, like belladonna and stramonium, is anodyne, sedative and antispasmodic. See page 395. It is stated that hyoscyamus is preferable to both belladonna and stramonium in the treatment of colic, certain forms of irritable bladder and of whooping and nervous cough.

Dose: 3 gr. (0.2 Gm.).

Official Preparations: U.S.P. X.

Extract of Hyoscyamus, $\frac{5}{6}$ gr. (0.05 Gm.).
Fluidextract of Hyoscyamus, 3 m. (0.2 cc.).
Tincture of Hyoscyamus, 30 m. (2 cc.).

SCOPOLA

(skȯ̆-pō′lȧ)

SCOPOLA—U.S.P. VIII

Synonym: Japanese Belladonna.

Source: Scopola Carniolica Jacquin (Fam. Solanaceæ).

Etymology: Scopola was named for Johann Scopoli, an Austrian naturalist, author and professor (1723–1788).

Carniolica from "Carniola," an Austrian province where the plant originally grew.

Part Used: The dried rhizome.

Description and Physical Properties: Of horizontal growth, more or less curved and shortly and sharply flexuous, cylindraceous and somewhat flattened vertically, occurring mostly in pieces from 2.5 to 7.5 cm. long and 0.8 to 1.6 cm. broad, often split before drying; upper surface marked with closely set, large, cup-shaped stem scars, margins irregularly contracted; externally varying from yellowish-brown to dark brownish gray, finely and irregularly wrinkled longitudinally, obscurely annulate and more or less nodular-roughened; fracture short and sharp, exhibiting a yellowish-white bark, its corky layer dark brown, or pale brown, wood indistinctly radiate, and central pith rather horny; nearly inodorous; taste sweetish, afterwards bitterish and strongly acrid.

Habitat: Germany, Austria, Russia, Japan.

Discussion: The genus, Scopola, is closely related to, and intermediate between, the genera, Atropa and Hyoscyamus. It resembles the Atropa in leaf and flowers, and in the microscopical character of the rhizome, but differs in that the fruit is a transversely dehiscent capsule instead of a berry. Scopola grows in damp, stony places in the hilly districts of the afore-named countries. In its general appearance, it resembles belladonna, but is much smaller, rarely growing more than 2 feet in height.

Constituents: Scopolamine, $C_{17}H_{21}NO_4+H_2O$; hyoscyamine. Scopolamine frequently has been called hyoscine. There seems to be considerable doubt as to whether there is such an alkaloid as hyoscine.

Properties and Uses: Scopola is very similar in its action to the drugs just studied, being analgesic, antiphlogistic, hypnotic and mydriatic. Scopolamine has been used in combination with morphine to produce general anesthesia, also to bring about "twilight sleep," a condition of partial anesthesia to lessen the pains of labor.

Dose: $\frac{3}{4}$ gr. (0.045 Gm.).

CAPSICUM

(kăp′sĭ-kŭm)

CAPSICUM—U.S.P.

Synonyms: Cayenne Pepper; Cockspur Pepper; African Pepper; Bird Pepper; Red Pepper; Spanish Pepper; African Chillies.

Source: Capsicum frutescens Linné (Fam. Solanaceæ).

Etymology: Capsicum from the Lat. "capsa" (Gr. "kapsa"), *a box* or *capsule*, referring to the shape of the fruit.

Frutescens from the Lat. "frutex," *a shrub* or *bush*, referring to the character of the plant.

Part Used: The dried, ripe fruit, grown in Africa.

Description and Physical Properties: *Unground Capsicum:* Oblong conical, usually laterally compressed, from 10 to 25 mm. in length, from 4 to 8 mm. in diameter, 2- or 3-locular, the dissepiments united to a short conical placenta at the base of the fruit; pericarp orange to dark brownish red, glabrous, shriveled, dull, thin, membranous; inner surface longitudinally striate, with 2 or 3 distinct longitudinal ridges; seeds, yellowish or brownish, 6 to 21, circular or irregular, flattened, from 2 to 4 mm. in diameter, with a thickened edge and prominent pointed micropyle; odor characteristic, sternutatory; taste intensely pungent.

Calyx light greenish brown, inconspicuous, inferior, 5-toothed, usually attached to a long, straight peduncle.

Habitat: Africa. Cultivated in many countries.

Discussion: Capsicum frutescens is a small, spreading shrub growing from 2 to 3 feet in height. The stems are much branched, the leaves alternate and the flowers of a greenish-yellow color. No doubt all are familiar with the plants producing the common red pepper and the mango pepper, and they will serve to convey a general idea of the plant in question. Capsicum was known to the Romans and was used in the East Indies from time immemorial. It is apt to be adulterated with the fruits of allied species or those from other countries than Africa. Numerous adulterants have been discovered in the powdered drug, e.g., corn meal, bran and sawdust, colored to imitate the genuine drug. In 1925, 2,648,386 pounds of capsicum were imported.

Constituents: Capsaicin, $C_{18}H_{27}NO_3$, is the chief active constituent. It is found mostly in the pericarp and placenta. Capsicine, whose existence is in question, is said to occur in small quantity. It is described as a volatile, liquid alkaloid devoid of pungency, having the odor of coniine. Volatile oil is present in small amount and gives to the fruit its characteristic odor. Resin is another constituent.

PROPERTIES AND USES: Capsicum is stomachic and condiment, stimulating the flow of saliva, gastric juice and the intestinal secretions. Thus it is used in indigestion, atonic dyspepsia and flatulent colic. Its stimulating action renders it useful in acute alcoholism, delirium tremens, sea-sickness and cholera. Capsicum is also a strong counter-irritant and rubefacient, and is applied in the form of liniments, plasters or ointments for rheumatism, chilblains and neuralgia.

DOSE: 1 gr. (0.06 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.

Oleoresin of Capsicum, ¼ gr. (0.015 Gm.).
Tincture of Capsicum, 8 m. (0.5 cc.).

DULCAMARA
(dŭl′kȧ-mā′rȧ)

DULCAMARA—N.F.

SYNONYMS: Woody Nightshade; Poison Berry; Wolf-grape; Bittersweet.

SOURCE: Solanum Dulcamara Linné (Fam. Solanaceæ).

ETYMOLOGY: Dulcamara from the Lat. "dulcis," *sweet*, and "amarus," *bitter*, because the taste is first bitter, then sweet. It will be observed that the Latin name reverses the order of these properties.

Solanum, the Lat. for *nightshade*, from "sol," *the sun*, so named from the fact that the plants of this family dislike the sun, preferring the shade.

PART USED: The dried stem.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Dulcamara:* In short sections about 5 mm. or less in thickness, cylindraceous, outline of transverse section somewhat angular, longitudinally striate, more or less warty; bark thin, externally pale greenish, or light greenish brown, glabrous, marked with alternate leaf scars; internally green, the greenish or yellowish wood occurring in 1 or 2 concentric rings; usually hollow in the center. Odor slight; taste bitter, afterwards sweet.

HABITAT: Europe, Asia, North America.

DISCUSSION: Bittersweet is a pubescent shrub climbing upon neighboring shrubs or trees to a height of 10 or 15 feet, or trailing along the ground if no supports are present. It grows along streams, in swamps and about dwellings throughout the north temperate zone. The leaves are covered with hairs on their under surface, the flowers are purple or pale-blue in color, and the fruit an oval red berry containing many seeds. The stems should be collected in the autumn after the close of the growing season, or in the early spring before their substance is required for the growing plant.

CONSTITUENTS: Dulcamarin ($C_{22}H_{34}O_{10}$), described by some as a bitter glucoside, by others as an alkaloid, having the formula, $C_{65}H_{100}N_2O_{29}$, while still others designate it as a "gluco-alkaloid" of uncertain composition; solanine ($C_{42}H_{87}NO_{15}$), a very bitter alkaloid.

PROPERTIES AND USES: At present its use is practically confined to the treatment of skin diseases, such as chronic eczema, acne and impetigo. For these it is employed both externally and internally.

DOSE: 1 dr. (4 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Dulcamara, 1 fl. dr. (4 cc.).

SOLANUM

(sǒ-lā′nŭm)

SOLANUM—N.F.

SYNONYMS: Horse-nettle; Bull-nettle; Apple of Sodom; Tread-leaf; Band-briar.

SOURCE: Solanum carolinense Linné (Fam. Solanaceæ).

ETYMOLOGY: Solanum, the Lat. for *nightshade*, from "sol," *the sun*.
Carolinense, from or of (North or South) Carolina.

PART USED: The air-dried, ripe fruit.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Solanum:* Globose, slightly depressed, somewhat shriveled and wrinkled in drying, from 0.8 to 2 cm. in diameter, orange yellow, glabrous, fleshy, two-celled, many-seeded, calyx and pedicel usually persistent; calyx stellate, pubescent, deeply incised, the five subdivisions ovate or ovate-lanceolate, acuminate and enclosing half or more of the berry; seeds orbicular, flat, yellow, smooth, shining. Odor pepper-like; taste bitter and acrid.

HABITAT: Eastern and Central United States.

DISCUSSION: This is a perennial, herbaceous plant growing from 1 to 2 feet in height and frequenting dry fields and waste places throughout many localities of the Eastern and Central States. The grayish-green, erect stem is covered with short hairs and thickly armed with short, yellow prickles. The leaves are also pubescent and beset with prickles. The orange-yellow, globose berries are nearly odorless and have a bitter-sweet taste.

CONSTITUENT: The alkaloid, solanine.

PROPERTIES AND USES: Solanum is employed as a nervine in epilepsy.

Dose: 60 gr. (4 Gm.).
Official Preparation: N.F. V.
Fluidextract of Solanum, 1 fl. dr. (4 cc.).

MANACA

(măn′ȧ-kȧ)

MANACA—N.F.

Synonym: Vegetable Mercury.

Source: Brunfelsia Hopeana Bentham (Franciscea uniflora Pohl) (Fam. Solanaceæ).

Etymology: Manaca, the native Indian name for the plant.

Uniflora from the Lat. "unum," *one*, and "flos, floris," *flower*, i.e., the flowers occur singly.

Part Used: The dried root.

Description and Physical Properties: *Unground Manaca:* Nearly cylindrical or more or less tortuous, of variable length and up to about 3 cm. in diameter; externally dark brown, wrinkled and with scaly yellowish cork patches, the latter being easily removed from the thin cortex which adheres closely to the wood; inner surface, bark thin, wood light yellowish, hard and finely radiate; fracture short and very tough; taste bitter; odor slight.

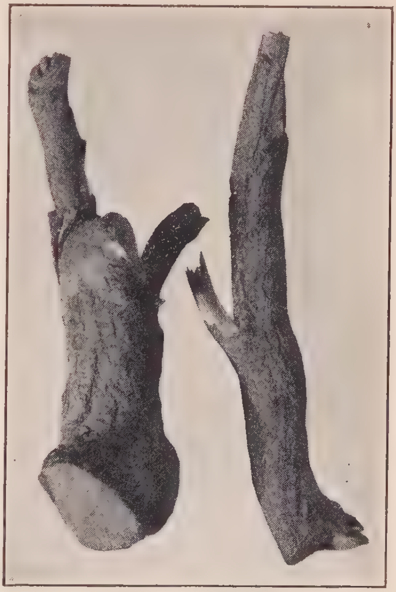


Fig. 93.—Manaca.

Habitat: The valley of the Amazon and the West Indies.

Discussion: This plant, which is a native of Brazil and the West Indies, is a large shrub with oblong, dark-green leaves and small flowers of a pale-violet-blue color. They occur singly (sometimes in pairs) along the branches.

Constituents: The principal constituent appears to be a resin, although a basic substance to which the name "manicine" has been ascribed, has been reported by some investigators.

Properties and Uses: Manaca has been claimed to act upon the spinal cord, first stimulating and then depressing the motor centers.

It has been used in the treatment of rheumatism, but its value seems at this time not to have been fully established.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Compound Elixir of Manaca, 1 fl. dr. (4 cc.).
Fluidextract of Manaca, 15 m. (1 cc.).

CHAPTER LXXII

SCROPHULARIACEÆ

(skrŏf′ū̇-lā′rĭ-ā′sē̇-ē)

FIGWORT FAMILY

This family consists of herbs and shrubs, rarely trees, comprising about 190 genera and 2500 species which are widely distributed. They have exstipulate leaves, a more or less irregular bilabiate corolla with four didynamous stamens and a 2-celled ovary.

LEPTANDRA

(lĕp-tăn′drȧ)

LEPTANDRA—N.F.

Synonyms: Culver's Root; Culver's Physic; Black Root; Bowman's Root; Beaumont Root; Whorlywort; Oxadoddy.

Source: Veronica virginica Linné (Fam. Scrophulariaceæ).

Etymology: Leptandra from the Gr. "leptos," *slender* or *thin*, and "andros," *man*, referring to its slender stamens, i.e., the male sex-organs.

Veronica, i.e., the flower of St. Veronica, said to resemble the face of Christ.

Scrophulariaceæ, so named because it was thought to be a remedy for scrofula.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Leptandra:* Rhizome usually of horizontal growth, nearly cylindrical, somewhat branched; branches readily separable from the main rhizome, from 4 to 10 cm. in length and from 4 to 13 mm. in diameter; externally grayish brown to dark reddish brown, annulate from circular scars of bud-scales, upper surface with short stem remnants, occasionally with buds, and numerous circular stem scars; from the under and lateral portions arise numerous coarse roots; fracture very tough and woody; internally, bark rather thin, dark brown and resinous, wood about the same thickness as the bark, light brown and porous, pith large, more or less hollow, the color being similar to that of the bark. Roots from 1 to 10 cm. in length and from 0.5 to 2 mm. in diameter; externally dark brown to purplish brown, smooth and faintly longitudinally wrinkled; fracture short; internally with a thick, brownish black cortex and small, light brown central cylinder. Odor characteristic; taste very bitter and acrid.

Habitat: North America from Canada to Georgia and westward as far as Minnesota.

Discussion: This plant is an herbaceous, perennial with a simple, erect stem from 3 to 6 feet in height. The leaves occur in whorls composed of from four to seven leaves. The flowers are disposed on long, terminal spikes. Leptandra grows throughout the northern portion of the United States east of the Mississippi River. Dr. Culver, for whom the drug was named, used it largely in his practice. Its use spread so rapidly that in a short time it became one of the early, popular native drugs. It is often cultivated for the sake of its beautiful flowers.

Constituents: Leptandrin; resin; tannin have been reported in the earlier literature. Just what the physiologically active constituents are does not seem to be known. More recently the following have been found: verosterol and compounds of methoxycinnamic acid.

Properties and Uses: This drug is a cholagogue purgative, tonic and alterative, which properties render it useful in chronic constipation due to an atonic condition of the duodenum with a lack of biliary and intestinal secretions.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Extract of Leptandra, 4 gr. (0.25 Gm.).
Fluidextract of Leptandra, 15 m. (1 cc.).
Vegetable Cathartic Pills, 2 pills.

DIGITALIS

(dĭj′ĭ-tā′lĭs)

DIGITALIS—U.S.P.

Synonyms: Foxglove; Fairy Gloves; Fairy Cap; Fairy Fingers; Fairy Thimbles; Fairy Bells; Ladies' Glove; Throatwort; Flopdock.

Source: Digitalis purpurea Linné (Fam. Scrophulariaceæ).

Etymology: Digitalis from the Lat. "digitus," *finger*, referring to the finger-shaped corolla. It was named in 1542 by Fusha, after the German name of the plant, "*fingerhut.*"

Purpurea from the Lat. "purpureus," *purple*, referring to the color of the flowers.

The word "foxglove" is a corrupted form of "folkglove," the word "folk" being synonymous with "*fairy*," which also explains the various other common names.

PART USED: The dried leaf responding to the biological assay specified by the pharmacopœia.

Digitalis, in the form of the tincture, properly diluted and injected into the ventral lymph sac of a frog, has a minimum systolic dose (the minimum dose producing in one hour a stoppage of the ventricle of the heart in systole) not exceeding 0.006 cc. of tincture, equivalent to 0.00,000,05 Gm. of ouabain, for each gram of body weight of frog. It contains not more than 2 per cent of browned leaves, stems, flowers, or foreign organic matter. and yields not more than 5 per cent of acid-insoluble ash.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Digitalis:* More or less crumpled or broken; blades ovate to ovate-lanceolate, about 25 cm. in length and contracted into a winged petiole; margin crenate or irregular; thin, lower surface densely pubescent, upper surface wrinkled, finely hairy; venation conspicuously reticulate, the midrib and principal veins broad and flat and the lower veins continued into the wings of the petiole; color of upper surface dark green, of lower surface grayish from the dense tomentose pubescence, the larger veins often purplish; odor slight when dry, peculiar and characteristic when moistened; taste very bitter.

HABITAT: Southern and Central Europe. Cultivated in the United States.

DISCUSSION: This is a beautiful, herbaceous plant with a biennial, or perennial, root which sends forth, the first year, a number of large, tufted leaves, and the following season, a single, erect, leafy stem terminating in a beautiful spike of purplish flowers. The flowers are arranged along one side of the stem in a pendulous manner and are either whitish or of a purplish-crimson color. They are marked with dots within, which doubtless serve to attract bees, since they are continually favored by their visits.

The previous revision of the pnarmacopœia required that the leaves used medicinally be collected from plants of the second year's growth. It appears now that leaves of the first year's growth are equally efficient and they may be used provided they come up to the assay standard of the pharmacopœia. If properly dried and preserved they keep well for a year or more, showing little or no loss of potency. Only the leaves which are full grown and fresh are collected. They are then carefully and quickly dried without exposure to the sun or undue heat. During the year 1924, 24,089 pounds of digitalis leaves were imported.

CONSTITUENTS: Digitoxin is the most active constituent. There is still some confusion as to its exact composition, two formulas having been arrived at by different investigators, Kiliani giving $C_{34}H_{54}O_{11}$ and Cloetta indicating $C_{44}H_{70}O_{14}$. This is said to be the principal constituent of the commercial digitalin of Nativelle ("French digitalin").

0.1 per cent of crystalline digitoxin has been obtained from digitalis leaves. This glucoside is insoluble in water but easily soluble in alcohol and chloroform.

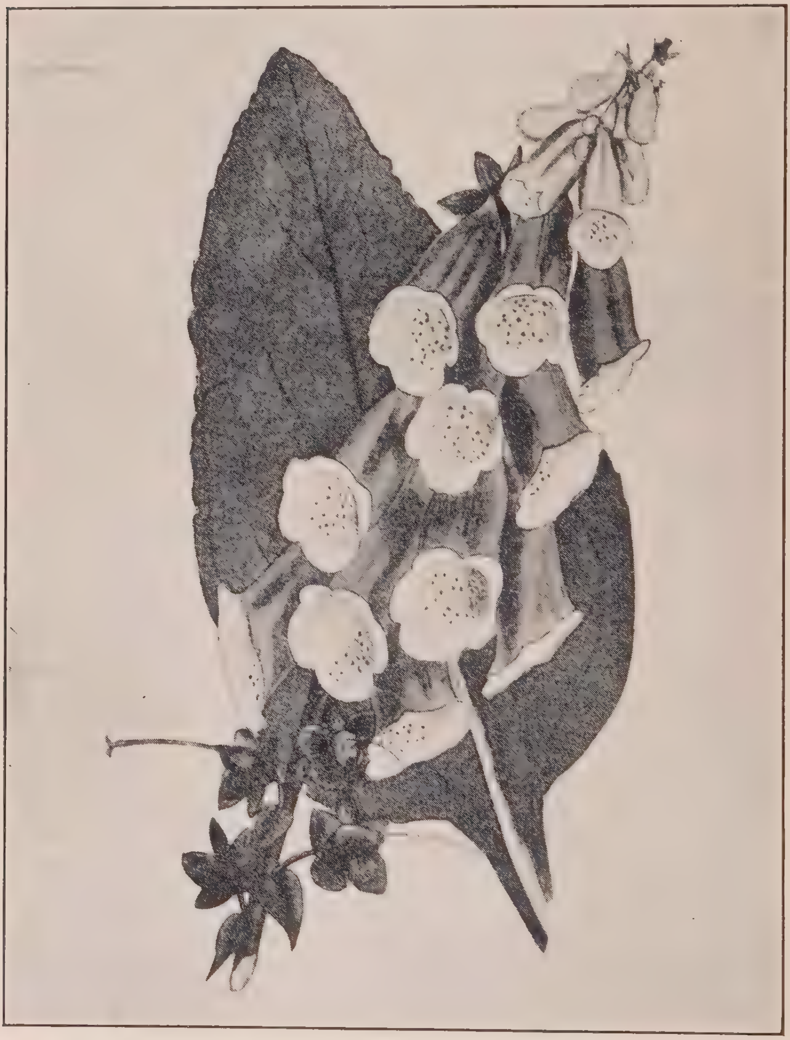


Fig. 94.—Digitalis leaf and flowers. (Courtesy of Parke, Davis & Company.)

Digitonin, a glucoside, is quantitatively the principal constituent of the "German digitalin" and has the composition $C_{54}H_{92}O_{28}$; is crystallizable and soluble in alcohol but less so in water.

Gitonin, another constituent of German digitalin, is crystallizable and levorotatory.

Digitalinum verum, also designated as digitalin, $C_{35}H_{56}O_{14}$, another glucoside, is the most active constituent of German digitalin. This is an amorphous substance sparingly soluble in water but more soluble in alcohol.

Less important constituents are digitoflavone, a yellow coloring matter, and digitin, physiologically inactive.

Properties and Uses: Digitalis is a cardiac tonic of the first order. In fact, a group of drugs of similar action has been named the "digitalis group of heart tonics."

In large over-doses the stimulation induced by this drug may be so strong as to arrest the heart in systole, thus producing instant death. Since the contractile force of the heart muscle is accompanied by a similar contraction of the arterioles, the blood supply to the tissues is lessened and that to the kidneys increased. This results in markedly increasing the diuresis. Indeed, the diuretic effect is one of the important actions of digitalis.

Digitalis is one of our best known, widely used and most reliable drugs. It is of outstanding value in the treatment of certain forms of heart disease, particularly, auricular fibrillation. In this condition digitalis is regarded as almost specific. The fibrillation results from abnormally originating impulses in the auricle which keep it in a state of tremor—irregular, rapidly succeeding partial contractions which are not complete enough to cause it to expel the blood within that chamber into the ventricle. The abnormal impulses originating in the auricles descend irregularly to the ventricles, causing rapid, irregular beats (without rhythm) some of which are not strong enough to send the blood forward into the aorta. The most conspicuous slowing of the pulse occurs in cases where there is a badly nourished heart.

When digitalis is given in such cases, in full doses, it gradually slows the heart by direct action upon the heart muscle, slowing the ventricles, which otherwise would exhaust themselves. Digitalis improves the tone and rhythm, makes the contractions more powerful and complete, sending out more blood to the tissues of the body, thus aiding the circulation, improving the nutrition of the entire body, including the heart itself, and hastening the removal of waste products, as shown by greatly increased diuresis. In fibrillation not accompanied by cardiac malnutrition, digitalis effects but little reduction in pulse rate.

Digitalis is very useful in auricular flutter, in which the auricle beats regularly but very rapidly. In this condition the ventricle responds to only half or less of the impulses from the auricle, though it still contracts regularly but rapidly. In such cases this drug acts, apparently, by changing the auricular flutter to fibrillation and reducing the ventricular contractions to a very slow rate. This auricular fibrillation, of recent origin, tends to recover spontaneously.

Digitalis is valuable in cardiac dilatation resulting from an overstrained, overburdened heart, one that is driven beyond its capacity and which has therefore become dilated. The improvement results from the slowing of the heart, giving it normal rest between beats, and from more complete and forceful contractions which reduce the size of the heart and make the walls fit closer to the valves, thus reducing the amount of leakage, back flow or regurgitation.

What has been stated leads to the suggestion that digitalis should prove of value in dropsical conditions. As a matter of fact, it is most useful in many such cases. When the circulation is defective and insufficient a whole train of disorders appears. Among these may be mentioned engorgement of the kidneys with venous blood, dilatation of the heart, dropsy, edema and congestion of the lungs, all of which are benefited by treatment with digitalis.

Some of the conditions named hereafter in which digitalis is indicated have been suggested, at least indirectly. These cases show betterment because of the improvement in the circulation and general nutrition. This is true in the second stage of pneumonia, in dropsy, weakness of the heart from injury, shock or poisoning, in congestion of the lungs and in certain fevers.

Digitalis is a physiological antagonist to aconite but is absorbed too slowly to serve as a suitable antidote for poisoning by aconite.

DOSE: 1½ gr. (0.1 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.
  Infusion of Digitalis, 1½ fl. dr. (6 cc.).
  Tincture of Digitalis, 15 m. (1 cc.).

(*a*) VERBASCI FLORES

(vẽr-băs′kĭ flō′rās)

MULLEIN FLOWERS—N.F.

(*b*) VERBASCI FOLIA

(vẽr-băs′kĭ fŏl′ĭ-ä)

MULLEIN LEAVES—N.F.

SYNONYMS: (*b*) Mullein Dock; Blanket-leaf; Feltwort; Flannel-leaf; Adam's Blanket; Velvet Plant.

SOURCE: (*a*) Verbascum phlomoides Linné, or Verbascum thapsiforme Schraeder (Fam. Scrophulariaceæ).

(*b*) Verbascum Thapsus Linné (Fam. Scrophulariaceæ).

ETYMOLOGY: Verbascum, the Lat. for "*mullein.*"

Phlomoides from the Gr. "phlomis," *mullein*, and the Lat. "oides," *like.*

Thapsiforme, from Thapsus, of or pertaining to the Island of Thapsos.

Flores, plural of the Lat. "flos, floris," *a flower*, from "florere," *to blossom.*

Folia, plural of the Lat. "folium," *leaf.*

PART USED: (*a*) The dried corollas with their adhering stamens.

(*b*) The dried leaves.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) Corolla light yellow, the outer surface grayish with a fine, soft, wooly indumentum, the inner surface sparsely hairy and finely veined; tube of the corolla 1 or 2 mm. in length and almost equally broad, the limb from 14 to 30 mm. in width, between wheel-shaped and saucer-shaped, obscurely two-lipped, the unequal lobes rounded, obovate. Stamens five, borne on the base of the corolla, shorter than the corolla, two of them longer than the other three, the filaments thick and fleshy, more or less pilose, especially the three shorter ones, usually orange colored. Stamen-hairs cylindrical, unicellular, non-branching, surface minutely reticulate, apex rounded, frequently enlarged. Pollen grains smooth, triangular and more or less rounded, from 0.025 to 0.035 mm. in diameter. Odor peculiar, agreeable; taste mucilaginous, not agreeable.

(*b*) *Unground Mullein Leaves:* Obovate with narrowed base, or varying to oblong or oblong-lanceolate, without a true petiole, obtuse or tending toward acuteness at the summit, from 1 to 6 dm. in length, and from 3 to 15 cm. in width; very thick, rather tough when damp, brittle when dry, light-yellowish gray or greenish gray, densely long-tomentose, with numerous, multicellular, branching, non-glandular hairs. Nearly odorless; taste mucilaginous and slightly bitter.

HABITAT: Central and Southern Europe, Asia, United States.

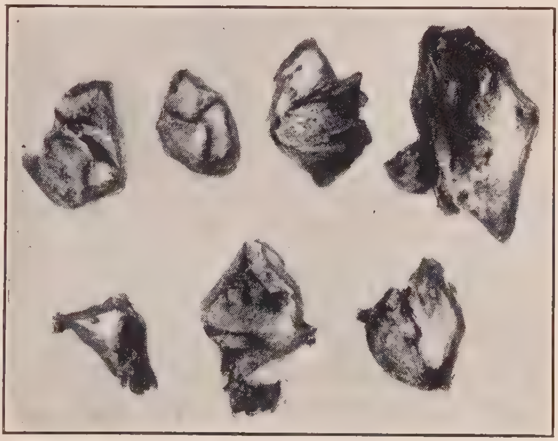


FIG. 95.—Mullein flowers.

DISCUSSION: The various species of mullein just enumerated are all of the same general character, having a simple, erect stem growing from 5 to 8 feet in height and terminating in a long, thick spike of yellow flowers. The radical leaves are very large, from 1 to 2 feet in length, while those on the stem are much smaller. Both the stem and leaves are covered with a thick woolly down which accounts for the numerous common names. The flowers are of a golden-yellow color when fresh and have a peculiar odor. They are gathered during the dry weather of the summer and carefully dried. The leaves are nearly odorless and have a bitterish taste. They are gathered at the same time as the flowers.

CONSTITUENTS: (*a*) The flowers: Mucilage; volatile oil; sugar.

(*b*) The leaves: Gum; resin; volatile oil, a trace; tannin.

PROPERTIES AND USES: Mullein is slightly diuretic and may be used for this property in cases of colds, fevers and minor congestions.

DOSE: (*a*) The flowers: 2 dr. (8 Gm.).

(*b*) The leaves: 1 dr. (4 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

(*a*) The flowers:

Pectoral Species, 1 dr. (4 Gm.).

(*b*) The leaves:

Fluidextract of Mullein Leaves, 1 fl. dr. (4 cc.).

CHAPTER LXXIII

LABIATÆ

(lā′bĭ-ā′tē)

MINT FAMILY

This family consists of herbs, shrubs, or rarely trees, and numbers about 3000 species. They are characterized by square stems and the 4-lobed ovary which develops into four 1-seeded nutlets. All species are aromatic and fragrant and many of them yield medicinal oils.

(*a*) MENTHA PIPERITA

(mĕn′thȧ pĭp′ĕr-ī′tȧ)

PEPPERMINT—U.S.P.

(*b*) OLEUM MENTHÆ PIPERITÆ

(ō′lē̇-ŭm mĕn′thē pī′pĕr-ī′tē)

OIL OF PEPPERMINT—U.S.P.

(*c*) MENTHOL

(mĕn′thŏl)

MENTHOL—U.S.P.

Synonyms: (*a*) Brandy Mint; Lamb Mint.
(*b*) Peppermint Oil.
(*c*) Peppermint Camphor.

Source: Mentha piperita Linné (Fam. Labiatæ).

Etymology: Mentha from the Gr. "Minthe," *a nymph*, the daughter of Cocytus. Mythology states that she was changed into a mint plant by Proserpine during a fit of jealousy.

Piperita from the Lat. "piper," *pepper*, referring to the pungent taste of the plant.

Labiatæ from the Lat. "labium," *lip*, from the fact that the corolla is divided into two unequal parts, one projecting over the other like a lip.

PART USED: (*a*) The dried leaves and tops.

(*b*) The volatile oil distilled from the fresh, over-ground parts of the flowering plant, and rectified by steam distillation.

Oil of peppermint yields not less than 5 per cent of esters, calculated as menthyl acetate ($C_{10}H_{19}.C_2H_3O_2$), and not less than 50 per cent of total menthol ($C_{10}H_{19}.OH$), free and as esters.

(*c*) Menthol: An alcohol ($C_{10}H_{19}OH$) obtained from the oil of peppermint or other mint oils.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) *Unground Peppermint:* Leaves more or less crumpled and frequently detached from the stem; ovate-oblong to oblong-lanceolate, petiole from 4 to 15 mm. in length, slightly pubescent, blade from 1 to 9 cm. in length, acute and sharply serrate, light green to purplish-brown; upper surface nearly glabrous, lower surface glandular-hairy, especially on the veins; stem quadrangular, from 1 to 3 mm. in diameter, glabrous except for a few scattered deflexed hairs; flower-whorls usually in a compact, oblong or oval spike, from 1 to 1.5 cm. in breadth, rounded at the summit, and in fruit attaining a length of from 3 to 7 cm.; bracts oblong-lanceolate, from 4 to 7 mm. in length; calyx tubular, equally 5-toothed, pubescent and glandular-punctate, often dark purple in color; corolla tubular-campanulate, 4-cleft, about 3 mm. in length and often light purple; stamens 4, short and equal; nutlets ellipsoidal, about 0.5 mm. in diameter, blackish brown; odor aromatic, characteristic; taste aromatic, pungent, followed by a cooling sensation in the mouth.

(*b*) A colorless liquid, having a strong, penetrating odor of peppermint, and a pungent taste, followed by a sensation of cold when air is drawn into the mouth.

(*c*) Colorless, acicular crystals having a strong, peppermint-like odor.

Menthol is slightly soluble in water; very soluble in alcohol, chloroform, ether, and in petroleum benzin. It is freely soluble in glacial acetic acid, liquid petrolatum, and in fixed or volatile oils.

When menthol is triturated with about an equal weight of camphor, chloral hydrate, phenol, or thymol, the mixture liquefies.

HABITAT: Europe, Asia, North America.

DISCUSSION: Peppermint is a perennial, herbaceous plant growing about 2 feet in height. It is found in moist lowlands and along the banks of streams where it spreads very rapidly by means of runners. It is grown on a large scale in England, Germany, Japan, New York, Michigan and Indiana for the recovery of the volatile oil. The plant is cut with a mowing machine, raked up into windrows with a hayrake, loaded on hayracks much like the processes used in making hay, and hauled to the stillhouse. It should be cut while in blossom and allowed to dry in the sun for a few hours before subjecting to the process of distillation.

The oil of peppermint is a complex mixture of some fifteen constituents, the most important one being menthol. Menthol is a stearopten occurring in colorless, acicular or prismatic crystals. It has a strong odor like peppermint and a warm aromatic taste. This taste is followed by a sensation of cold when air is drawn into the mouth. The menthol constitutes from 50 to 80 per cent of the oil. Menthol is a secondary alcohol and may be obtained from the Japanese oil by subjecting it to refrigeration. The liquid portion is poured off and the crystals dried between filter papers.

While peppermint oil irrespective of geographical source has about the same medicinal properties and value, there is a big difference in the aroma. American and English oils rank very high in respect to flavor and odor, while the Japanese oil stands low in the scale. On the other hand, the latter is the principal source of menthol because it can be separated from the oil without great difficulty, by refrigeration. The American oil does not yield its menthol upon such treatment.

Because of its high price, oil of peppermint is sometimes adulterated. Dementholized oil sometimes has been placed on the market as pure oil. Camphor oil and the oil of sassafras have also been added, but these sophistications can be detected easily by applying the tests for purity given in the pharmacopœia. Notwithstanding the large amount of oil of peppermint manufactured in this country, the statistics show that some was imported in 1924. This amounted to but 376 pounds and was valued at $3847.

Constituents: (*a*) Of the leaves: Volatile oil.
(*b*) Of the oil: Menthol.

Properties and Uses: Peppermint is used as a carminative and antispasmodic in nausea, vomiting, colic and hiccough. Its aromatic and stimulating properties render it useful in diarrhea, dysentery, and various minor digestive disturbances. Locally the oil acts as a counter-irritant as in neuralgia and toothache. The oil enters largely into the manufacture of confectionery and is employed as a flavor in the culinary art. Menthol is an ingredient of many popular nasal sprays used in coryza, pharyngitis, etc. It has antiseptic properties and is a popular ingredient of a number of preparations employed locally for various skin diseases in which it acts as a local analgesic, allaying itching and pain.

Dose: (*a*) Peppermint: 60 gr. (4 Gm.).
(*b*) Oil of Peppermint: 1½ m. (0.1 cc.).
(*c*) Menthol: 1 gr. (0.06 Gm.).

Official Preparations: U.S.P. X.
(*a*) and (*b*) Peppermint and Oil of Peppermint:
Spirit of Peppermint, 15 m. (1 cc.).
(*b*) Oil of Peppermint:
Peppermint Water, 4 fl. dr. (15 cc.).

(*a*) MENTHA VIRIDIS

(mĕn′thȧ vĭr′ĭ-dĭs)

SPEARMINT—U.S.P.

(*b*) OLEUM MENTHÆ VIRIDIS

(ō′lē̆-ŭm mĕn′thē vĭr′ĭ-dĭs)

OIL OF SPEARMINT—U.S.P.

Synonyms: (*a*) Brown Mint; Garden Mint; Mackerel Mint.

(*b*) Spearmint Oil.

Source: Mentha spicata Linné (Mentha viridis Linné) (Fam. Labiateæ).

Etymology: Mentha (see under the preceding drug).

Spicata from the Lat. "spica," *a spike* or *ear*, referring to the arrangement of the flowers.

Viridis, the Lat. for *green*.

Spearmint, from its spear-like infloresence, i.e., the shape of the flower-heads.

Part Used: (*a*) The dried leaves and tops.

(*b*) The volatile oil distilled from the fresh, overground parts of the flowering plants.

Description and Physical Properties: (*a*) *Unground Spearmint:* Leaves more or less crumpled, ovate-lanceolate, unequally serrate, nearly sessile or with a petiole less than 5 mm. in length, of a bright green color and somewhat glandular-hairy on the under surface; stem, occasionally with characteristic opposite branches, distinctly quadrangular, from 1 to 3 mm. in diameter, nearly glabrous and light brown or purplish colored; flowers arranged in opposite clusters and in more or less interrupted or crowded lanceolate, nearly acute spikes; bracts linear-lanceolate, subulate, from 7 to 10 mm. in length, subtending the flower clusters; calyx tubular, 5-toothed, glandular-punctate and somewhat pubescent near the teeth; corolla nearly white or light brown; stamens extending beyond the corolla tube; odor slightly pungent, characteristic; taste aromatic, characteristic but not followed by a cooling sensation in the mouth.

(*b*) A colorless, yellow or greenish-yellow liquid, having the characteristic odor and taste of spearmint.

Habitat: Europe, Asia, Canada, United States.

Discussion: The general appearance and geographical distribution of spearmint is practically the same as that of peppermint. Like the the peppermint, also, it is cultivated for domestic use as well as for the recovery of the volatile oil.

Constituents: (*a*) Spearmint: Volatile oil.

(*b*) This oil contains no menthol, but must contain not less than 43 per cent by volume, of carvone, $C_{10}H_{14}O$.

PROPERTIES AND USES: The properties and uses of spearmint and its volatile oil are in every respect similar to those of peppermint and its oil, except that it contains no menthol. On this account it is a little milder in its action and is therefore usually preferred for the disorders of infancy.

DOSE: (*a*) Spearmint: 60 gr. (4 Gm.).
(*b*) Oil of spearmint: 1½ m. (0.1 cc.).

OFFICIAL PREPARATIONS: U.S.P. X.
(*b*) Oil of Spearmint:
Spearmint Water, 4 fl. dr. (15 cc.).
(*a*) and (*b*) Spearmint and Oil of Spearmint:
Spirit of Spearmint, 15 m. (1 cc.)

HEDEOMA

(hē′dḗ-ō′mȧ)

HEDEOMA—U.S.P. VIII

SYNONYMS: Pennyroyal; Squawmint; Mosquito Plant; Tickweed.

SOURCE: Hedeoma pulegioides (Linné) Persoon (Fam. Labiatæ).

ETYMOLOGY: Hedeoma from the Gr. "hedys," *sweet*, and "osme," *smell*, referring to the odor of the plant.

Pulegioides from the Lat. "pulegium," *fleabane*, from "pulex," *a flea*, and "oides," *like* or *resembling*, i.e., similar to or resembling fleabane.

Pennyroyal, altered from puliol and royal. The word penny is now used for the obsolete "puliol," from "pulex," *a flea*, and "regium," *royal*, i.e., royal or effective against fleas.

PART USED: The dried leaves and flowering tops.

DESCRIPTION AND PHYSICAL PROPERTIES: Branchlets quadrangular, with numerous spreading hairs; leaves opposite, short-petioled, oblong-ovate, 15 to 35 mm. long, thin, obtuse, obscurely serrate, glandular-hairy beneath; flowers in axillary fascicles, with a tubular-ovoid, bilabiate and 5-toothed calyx, and a pale blue, spotted, bilabiate corolla, containing two sterile and two fertile, exserted stamens; odor strong, somewhat mint-like; taste aromatic and pungent.

HABITAT: United States from Canada to Florida and westward as far as Nebraska.

DISCUSSION: Pennyroyal is an annual plant growing in barren sand, hilltops and in poor soil in open places in the woods. Like the mints, it has a quadrangular stem which grows to the height of a foot or 15 inches. The leaves are opposite, about an inch in length and hairy and glandular on the under surface. The flowers are very small, pale-blue in color and arranged in axillary whorls along the entire length of the branches.

CONSTITUENTS: Volatile oil, 1 per cent; bitter principle; tannin.

PROPERTIES AND USES: Pennyroyal is aromatic, stimulant and carminative and the oil has sometimes been used to correct the action of nauseating or griping cathartics. The drug is a strong emmenagogue and is administered in the form of a hot infusion which may be supplemented with hot hip and foot baths for amenorrhœa. Death has sometimes followed the administration of excessive doses of the oil given for the purpose of producing abortion. The oil is sometimes added to liniments for its rubefacient and counter-irritant properties. It has the reputation of being very effective as a repellant for mosquitoes, fleas and other insects, but this virtue is probably greatly over-estimated.

DOSE: 120 gr. (8 Gm.). (Usually administered in the form of a hot infusion.) From 2 to 10 m. (0.125 to 0.6 cc.) of the oil may be administered.

OLEUM LAVANDULÆ

(ō′lē̇-ŭm lăv′ȧn-dū′lĕ)

OIL OF LAVENDER—U.S.P.

SYNONYM: Lavender Oil.

SOURCE: Lavandula Spica Linné (Lavandula officinalis Chaix, Lavandula vera De Candolle) (Fam. Labiatæ).

ETYMOLOGY: Lavandula is of uncertain origin.

Spica, the Lat. for *spike* or *ear*, referring to the fact that the flowers are arranged in the form of a spike.

PART USED: The volatile oil distilled from the fresh flowering tops.

DESCRIPTION AND PHYSICAL PROPERTIES: A colorless or yellow liquid, having the characteristic odor and taste of lavender flowers.

HABITAT: Spain, Italy, Southern France. Cultivated in England and the United States.

DISCUSSION: Lavender is a small shrub. The flowers are bilabiate and occur in terminal spikes. They are very fragrant and of a lavender color. The plant grows native in dry, barren places in southern Europe, but is raised for the oil in England and America where it has developed into an industry of some importance. The yield of oil is from 1.5 to 3 per cent.

CONSTITUENTS: Oil of lavender is required by the U.S.P. X. to yield not less than 30 per cent of esters calculated as linalyl acetate ($C_{10}H_{17}.C_2H_3O_2$). It also contains several esters of linalyl; sesquiterpenes; limonene; cineol and geraniol.

Properties and Uses: Because of its pleasant aromatic odor, oil of lavender is largely employed in the manufacture of perfumes and cosmetics. Its pharmaceutical use is confined principally to the flavoring of various preparations, although it is useful as a mild stimulant in nervous headache and depression.

Dose: 1½ m. (0.1 cc.).

Official Preparations: U.S.P. X.

Spirit of Lavender, 30 m. (2 cc.).
Compound Tincture of Lavender, 30 m. (2 cc.).

OLEUM ROSMARINI

(ō′lē̆-ŭm rōz-mâr′ĭ-nī)

OIL OF ROSEMARY—U.S.P.

Synonym: Rosemary Oil.

Source: Rosmarinus officinalis Linné (Fam. Labiatæ).

Etymology: Rosmarinus from the Lat. "ros," *dew*, and "marinus," *marine*. In English the word has been modified to mean the *rose of Mary*.

Officinalis from the Lat. "officina," *a work shop* or *store*, from "opus," *work*, and "facere," *to do*, i.e., kept for sale.

Part Used: The volatile oil distilled from the fresh flowering tops.

Description and Physical Properties: A colorless or pale yellow liquid, having the characteristic odor of rosemary, and a camphoraceous taste.

Habitat: France, Spain, Italy. Cultivated in Europe and the United States.

Discussion: Rosemary leaves were official in the pharmacopœia of 1880. The plant is a small evergreen shrub. The stem is erect and is divided into slender, ash-colored branches. The flowers are of a pale-blue color and occur in whorls about the stems near the ends of the branches.

Constituents: Oil of rosemary is required by the U.S.P. X. to contain not less than 2.5 per cent of esters calculated as bornyl acetate ($C_{10}H_{17}.C_2H_3O_2$), and not less than 10 per cent of total borneol ($C_{10}H_{17}OH$) free and as esters.

Properties and Uses: Oil of rosemary is carminative and is employed in combination with other drugs for that purpose. Its stimulant property renders it useful in liniments as a rubefacient.

Dose: 1½ m. (0.1 cc.).
Official Preparations: U.S.P. X.
Compound Tincture of Lavender, 30 m. (2 cc.).
N.F. V.
Perfumed Spirit.

(*a*) THYMUS
(thī'mŭs)

THYME—N.F.

(*b*) OLEUM THYMI
(ō'lē-ŭm thī'mī)

OIL OF THYME—N.F.

(*c*) THYMOL
(tīm'ōl)

THYMOL—U.S.P.

Synonyms: (*a*) Garden Thyme; Mother of Thyme.

Source: Thymus vulgaris Linné (Fam. Labiatæ).

Etymology: Thymus from the Gr. "thyein," *to sacrifice*, from "thyos," *a sacrifice, offering* or *incense*, because of its use as an incense in connection with sacrifices.

Vulgaris from the Lat. "vulgus," *the multitude, the common people*, i.e., the common or usual kind.

Part Used: (*a*) The leaves and tops.

(*b*) The volatile oil distilled from the flowering plant and containing not less than 20 per cent, by volume, of phenols.

(*c*) A phenol ($C_6H_3.CH_3.OH.C_3H_7$ 1 : 3 : 4) obtained from the volatile oil.

Description and Physical Properties: (*a*) *Unground Thyme:* Stems quadrangular, about 0.5 mm. in diameter, grayish brown or purplish in color, pubescent, nodes from 5 to 20 mm. apart, occasionally with the opposite leaves attached; leaves linear, linear-lanceolate, or ovate, oblong, from 0.5 to 6 mm. in length, and from 0.5 to 2 mm. in breadth, summit acute, base obtuse tapering into a petiole from 0.5 to 2 mm. in length, margin revolute, upper surface grayish green, puberulent, with numerous one-celled, thick-walled, non-glandular hairs; lower surface grayish, pubescent, with nonglandular, one- to four-celled, thick-walled, rough simple hairs, up to 0.135 mm. in length and usually curved at the first joint in the bases; numerous compound glandular secreting hairs, with short one-celled stalk occurring chiefly on the upper surface and depressed in the cuticle, which give the leaf a glandular-punctate appearance; inflorescence in about twelve-flowered axillary whorls; flowers polygamous, calyx tubular, about 4 mm. in length, ovoid or slightly curved on the lower side near the base, from nine- to twelve-nerved, pubescent, the throat bearded with straight simple hairs up to 1 mm. in length, bilabiate, upper lip three-toothed, lower lip with two hairy, ascending attenuate divisions, corolla about twice as long as the calyx, purplish, smooth within, slightly pubescent without, upper lip emarginate, lower spreading and three-lobed, stamens slightly didynamous and exserted, stigma bifid; nutlets about 0.5 mm. in diameter, spheroidal and finely tuberculate. Odor agreeable, aromatic; taste aromatic and warming.

(*b*) *Oil of Thyme:* A colorless or red liquid, having a characteristic odor and taste.

It is soluble in two volumes of 80 per cent alcohol.

(*c*) Large, colorless, transparent crystals, having an aromatic, thyme-like odor, and a pungent, aromatic taste.

One Gm. of Thymol is soluble in about 1000 cc. of water, about 1 cc. of alcohol, 0.7 cc. of chloroform, 1.5 cc. of ether, and in 1.7 cc. of olive oil, at 25° C. It is soluble in glacial acetic acid and in fixed or volatile oils.

HABITAT: Southern Europe from Portugal to Greece. Cultivated in the United States.

DISCUSSION: Thymus vulgaris is a small shrub, usually about a foot in height, with light-brown bark, purplish shoots and quadrangular stems. The leaves are about a half inch in length, pubescent beneath and dotted with numerous oil glands. The flowers are of a pale-purplish color and occur in the form of whorled spikes. The plant has a strong, aromatic, rather agreeable odor due to the volatile oil present. The oil when first distilled has a reddish-brown color and is known as the "*red oil.*" After redistillation it appears nearly colorless and goes by the name of "*white oil.*" 1342 pounds of thyme were imported in 1924.

CONSTITUENTS: Thymol and carvacrol, in varying proportions, but with the thymol always in excess, are the more important constituents of the French oil and are present in from 20 to 42 per cent. The other constituents are cymene ($C_{10}H_{14}$), borneol, linalool, and pinene. In the Spanish oil the carvacrol appears in greater proportion, the total phenol content running from 50 to 70 per cent.

PROPERTIES AND USES: Oil of thyme is stimulant, emmenagogue and antispasmodic. It is used in a variety of conditions such as rheumatism, neuralgia, etc., being applied in the form of a liniment. Thymol is antiseptic, parasiticide and deodorant and, being the most active constituent, may replace it for many purposes. It is an anthelmintic, being especially serviceable against the hookworm for which it is almost a specific. As a deodorant it is employed to lessen the fetor from sores, ulcers and gangrene. It is employed as an internal and external antiseptic, and as a parasiticide in various skin diseases. The fresh plant is employed as a condiment to aid in the digestion of fatty meats such as goose, duck and pork.

Dose: (*a*) Thyme: 1 dr. (4 Gm.).
(*b*) Oil of thyme: 1½ m. (0.1 cc.).
(*c*) Thymol: As an antiseptic, 2 gr. (0.125 Gm.).
As an anthelmintic, 30 gr. (2 Gm.).

Official Preparations: N.F. V.
(*a*) Fluidextract of Thyme, 1 fl. dr. (4 cc.).
Syrup of Thyme, 1 fl. dr. (4 cc.).
Compound Syrup of Thyme, 1 fl. dr. (4 cc.).
(*b* and *c*) Oil of thyme and thymol:
Antiseptic Solution, 1 fl. dr. (4 cc.).
(*b*) Oil of thyme:
Oleo-Balsamic Mixture.
Compound Oil of Hyoscyamus.

SALVIA

(săl′vĭ-ȧ)

SAGE—U.S.P. VIII

Synonyms: Garden Sage; Meadow Sage.

Source: Salvia officinalis Linné (Fam. Labiatæ).

Etymology: Salvia from the Lat. "salvare," *to save*, referring to its use in preserving meats.

Officinalis from the Lat. "officina," *a workshop* or *store*, from "opus," *to work*, and "facere," *to do*, i.e., kept for sale in the stores.

Sage from the Old Eng. "sauge," from the Lat. "salvia, salvus," *saved*.

Part Used: The dried leaves.

Description and Physical Properties: Long and stoutly petiolate, the blade elliptical or ovate-oblong, 3 to 7 cm. long, obtuse or subacute at the summit, rounded or subcordate at the base, finely crenulate, thick, grayish-green, very pubescent, especially on the under surface, conspicuously reticulate-veined; odor aromatic; taste aromatic, bitter, and somewhat astringent.

Habitat: Southern Europe. Cultivated in England, France, Italy and the United States.

Discussion: Sage is a perennial plant with a quadrangular, almost shrubby stem growing about 2 feet in height. The leaves are opposite, wrinkled, and of a grayish-green color tinged with red or purple. The flowers are blue, variegated with white and purple, and occur in distinct whorls on long terminal spikes. The leaves should be gathered while the plant is in bloom. The importation of sage for the year 1924 amounted to 2,170,980 pounds.

Constituents: Volatile oil, 0.5 to 2 per cent; resin; tannin; a bitter principle.

Properties and Uses: The most important use of sage is that of a condiment, for which it has been employed from time immemorial, as a seasoning for pork and fat fowls. Sage possesses some astringency and this, together with its stimulant and slight antiseptic properties has suggested its use in domestic medicine, especially in the form of an infusion (sage tea), as a wash or gargle for ulcers of the mouth and throat.

Dose: 30 gr. (2 Gm.).

MARRUBIUM

(mă-rōō′bĭ-ŭm)

MARRUBIUM—U.S.P. VIII

Synonyms: Horehound; White Horehound; Hoarhound.

Source: Marrubium vulgare Linné (Fam. Labiatæ).

Etymology: Marrubium from the Hebrew "mar," *bitter*, and "rob," *much* or *great*, i.e., very bitter, referring to the taste.

Vulgare from the Lat. "vulgaris," *common*, from "vulgus," *the multitude, the common people*, i.e., growing wild.

Horehound is the Old Eng. name for the plant. It was derived from the Anglo-Saxon "har," *gray*, and "hune," *hound*, because the stems and branches are covered with a grayish felt resembling the hairy coat of a certain breed of dogs.

Part Used: The dried leaves and flowering tops.

Description and Physical Properties: Branches quadrangular, grayish green, densely white-hairy; leaves opposite, petiolate, roundish-ovate, 1.5 to 5 cm. long, obtuse, coarsely crenate, strongly rugose-veined, more or less white-hairy; especially underneath; flowers in dense axillary whorls, with a 10-toothed calyx, the divisions of which are slightly unequal, erect-spreading and pungent; corolla small, whitish, bilabiate; stamens four, included; fruit of four ovoid, obtuse, nearly smooth nutlets, about 1.5 mm. long; odor distinct, rather agreeable; taste somewhat aromatic and bitter.

Habitat: Europe and Central Asia. Naturalized in North America.

Discussion: Horehound has a perennial root with numerous annual stems growing about a foot or 18 inches in height. The flowers are white and occur in crowded axillary whorls of wooly appearance.

Constituents: Volatile oil; marrubiin, a bitter glucoside; resin; tannin.

Properties and Uses: A hot infusion of horehound sometimes is used in domestic medicine as a diaphoretic for the purpose of breaking up a cold. This same preparation is also actively diuretic and is beneficial in rheumatism, intermittent fevers and amenorrhœa. On account of its tonic and stomachic properties, it is useful in dyspepsia, jaundice and chronic hepatitis. The horehound candy and lozenges are the most popular forms of administration. The candy is made by dissolving sugar in an infusion of hoarhound, boiling to the proper temperature and pouring into molds.

Dose: 30 gr. (2 Gm.).

SCUTELLARIA
(skū′tĕ-lā′rĭ-ȧ)

SCUTELLARIA—N.F.

Synonyms: Scullcap; Blue Scullcap; Hoodwort; Helmet Flower; Hooded Willow-herb; Blue Pimpernel; Madweed.

Source: Scutellaria lateriflora Linné (Fam. Labiatæ).

Etymology: Scutellaria from the Lat. "scutella," *a small dish*, from "scuta," *a dish* or *platter*, referring to the shape of the calyx. This peculiar shape also accounts for the popular names of scullcap, helmet flower, etc.

Lateriflora from the Lat. "latus, lateris," *side*, and "flos, floris," *a flower*, i.e., the flowers occur in long, lateral (one side of the stem only) racemes.

Scullcap, from the fact that the inverted calyx appears like a helmet with the visor raised, and after flowering closes upon the seeds as a cap.

Part Used: The dried overground portion.

Description and Physical Properties: *Unground Scutellaria:* About 50 cm. in length or in shorter broken pieces, smooth; stem quadrangular, branched; leaves opposite, smooth, petiolate, about 5 cm. in length, ovate-lanceolate or ovate-oblong, serrate; flowers about 6 mm. in length, in axillary one-sided racemes, with a pale blue corolla and bilabiate calyx, closed in fruit, the upper lip helmet-shaped. Odor slight; taste slightly bitter.

Habitat: Canada and the United States.

Discussion: This is a perennial, herbaceous plant with a branched stem from 1 to 2 feet in height. The flowers are small, of a pale-bluish color and arranged in long, lateral, leafy racemes. The plant grows in damp thickets and the moist soil along streams and ponds. It is one of a few of the mint family that is not aromatic. It was formerly vaunted as a specific for hydrophobia, hence the name "*madweed.*"

Constituents: Scutellarin, a crystalline bitter principle or glucoside; tannin. The scutellarin, a resinoid of the Eclectics, is made by pouring a concentrated alcoholic extract into alum-water and recovering the precipitate formed.

Properties and Uses: It is not certain that scutellaria possesses any medicinal properties worthy of mention.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Fluidextract of Scutellaria, 15 m. (1 cc.).
Compound Tincture of Viburnum, 1 fl. dr. (4 cc.).

CATARIA

(kȧ-tā′rĭ-ȧ)

CATNEP—N.F.

Synonyms: Catmint; Catnip.

Source: Nepeta Cataria Linné (Fam. Labiatæ)

Etymology: Cataria the Lat. for *catnip.* The comnon names, "catnip," etc., were all given in allusion to the peculiar fondness which cats show for the plant.

Part Used: The dried leaves and flowering tops.

Description and Physical Properties: *Unground Catnep:* Top, from 10 to 20 cm. long, much branched, or crushed and broken; stems quadrangular, downy, up to 4 mm. in diameter; leaves opposite, the larger, petiolate, from 2 to 7 cm. long, ovate or oblong, rounded or heart-shaped at the base, pointed at the apex, pale gray-green, soft-hairy above, downy beneath, margin deeply crenate; floral leaves small, bract-like; flowers small, in dense, interrupted spikes; calyx hairy, tubular, curved obliquely and sub-equally 5-toothed; corolla whitish, dotted with purple, throat dilated, limb bilabiate, the upper lip erect and two cleft, the lower spreading and three cleft, the middle lobe largest, crenulate; stamens two pairs ascending under the upper lip, lower pair shorter. Odor faintly aromatic and mint-like; taste bitter, pungent and aromatic.

Habitat: Europe, Asia. Naturalized in the United States.

Discussion: Catnep is a perennial, herbaceous plant growing from 2 to 3 feet in height. The stems are quadrangular and, like the leaves, are covered with a fine grayish down. All parts of the plant are pervaded with the volatile oil which gives to it its peculiar, mint-like odor.

Constituents: Volatile oil; bitter principle; tannic acid.

Properties and Uses: Because of its stimulant carminative and antispasmodic action, catnep is used in hysteria and colic. Popularly it is used as an emmenagogue in the form of a hot infusion.

Dose: 60 gr. (4 Gm.).

Official Preparations: N.F. V.

Elixir of Catnep and Fennel, for infants 8 m. (0.5 cc.).
Fluidextract of Catnep, 1 fl. dr. (4 cc.).

CHAPTER LXXIV

LOBELIACEÆ

(lȱ-bē′lĭ-ā′sė̄-ē)

LOBELIA FAMILY

This family consists of 30 genera and nearly 600 species. They are characterized by the extremely irregular corolla and syngenesious anthers. The plants are widely distributed, but are especially abundant in the Hawaiian Islands.

LOBELIA

(lȱ-bē′lĭ-ȧ)

LOBELIA—U.S.P.

Synonyms: Indian Tobacco; Wild Tobacco; Asthma Weed; Bladder Pod; Eye-bright; Gagroot.

Source: Lobelia inflata Linné (Fam. Lobeliaceæ).

Etymology: Lobelia was named for Matthias de Lobel (1538–1616), a Flemish botanist, physician and author, a native of Lille, who became Physician to King James I.

Inflata from the Lat. "inflatus," *inflated* or *swollen*, i.e., the seeds are borne within inflated, egg-shaped pods.

Part Used: The dried leaves and tops.

Description and Physical Properties: *Unground Lobelia:* Leaves alternate, sessile or narrowing into a short petiole, usually more or less broken; when entire, blades ovate or oblong, from 2 to 9 cm. in length, obtusely toothed or irregularly serrate-denticulate, each tooth with a yellow-brown, gland-like apex; pale green and with scattered bristly hairs; stem cylindrical, coarsely and irregularly furrowed, yellowish green, occasionally purplish and with numerous spreading hairs; flowers pale blue, in a long, loose raceme with short pedicels, calyx tubes ovoid, with 5 subulate teeth, corollas tubular, from 3 to 4 mm. in length, 5-parted, the upper 2-lobed portion cleft nearly to the base; stamens with anthers united above into a curved tube enclosing the bifid stigma; capsule ovoid or ellipsoidal, from 5 to 8 mm. in length, light brown, wholly inferior and enclosing numerous brownish, oblong and coarsely reticulate seeds; odor slight and irritating; taste strongly acrid.

HABITAT: Canada and the United States.

DISCUSSION: Lobelia is an annual plant with a single, erect, pubescent stem, usually between 1 and 2 feet in height. The stem is much branched about midway, but the main stem rises considerably higher than the branches. The leaves are scattering, 2 to 3½ inches in length and of a pale-greenish color. The flowers are very numerous and are arranged in leafy, terminal racemes. The fruit is an oval, inflated, 2-celled capsule containing many seeds. Lobelia was popular with the North American Indians, but Dr. Cutler of Massachusetts introduced it into our materia medica.

CONSTITUENTS: Lobeline, a liquid volatile alkaloid; lobelic acid; volatile oil; resin. These are the constituents usually described. Weiland has reported four crystallizable alkaloids: lobeline, $C_{23}H_{29}NO_2$; the only other one of importance, lobelidine, $C_{20}H_{25}NO_2$.

PROPERTIES AND USES: Lobelia is expectorant, emetic and antispasmodic. It is employed in respiratory affections as in spasmodic bronchitis, asthma and croup. Large doses are promptly emetic, producing a general relaxation with a cold skin and profuse perspiration, similar to the symptoms sometimes caused by tobacco. Its use as an emetic, however, has entirely given way to simpler, more reliable, and less disagreeable remedies.

DOSE: 1½ gr. (0.1 Gm.)

OFFICIAL PREPARATIONS: U.S.P. X.

Tincture of Lobelia, 15 m. (1 cc.).

N.F. V.

Fluidextract of Lobelia, 1½ m. (0.1 cc.).

CHAPTER LXXV

CUCURBITACEÆ

(kŭ-kûr′bĭ-tā′sē̇-ē)

GOURD FAMILY

These are chiefly creeping, or tendril-climbing, herbaceous vines. They comprise about 90 genera and 700 species and are found for the most part in the tropics. The flowers are diœcious or monœcious, with either one or three stamens. The leaves are palmately lobed. The fruit is a modified berry called a "*pepo*." The pumpkin, squash, watermelon, muskmelon and cucumber belong to this family.

COLOCYNTHIS

(kŏl′ō̆-sĭn′thĭs)

COLOCYNTH—U.S.P.

Synonyms: Bitter Apple; Bitter Gourd; Bitter Cucumber; Colocynth Apple; Colocynth Fruit.

Source: Citrullus Colocynthis (Linné) Schrader (Fam. Cucurbitaceæ).

Etymology: Citrullus from the Lat. "citrus," or the Gr. "kitron," both of Arabic origin and signifying "*orange*," because the ripe fruit is of an orange color.

Colocynthis from the Gr. "kolokynthis," the classical name of the fruit.

Cucurbitaceæ from the Lat. "cucurbita," *a gourd*, from "cucumis, cucumeris," *a hollowed-out vessel*, from the Celtic "kukh," *hollow*, and "orbis," *a ring* or *round*, referring to the spherical shape of the fruit.

Part Used: The dried pulp of the unripe but fully-grown fruit.

Description and Physical Properties: *Unground Colocynth:* In light, spongy, easily-broken pieces; yellowish white or light brown with occasional small patches of darker epicarp; odor slight; taste intensely bitter. Fruits, before removal of seed, nearly globular, from 4 to 10 cm. in diameter, with three large lenticular cavities between the three carpels, hence easily separable longitudinally into three parts. Seeds ovoid, compressed, light yellow to brown.

Habitat: Arabia, Morocco, Egypt, Syria, Spain, Japan, Greece, Cape of Good Hope.

Discussion: This plant is an annual, resembling our melon vines. The stems trail along the ground or climb upon neighboring objects to which they attach themselves by means of their numerous tendrils. The fruit is a globular pepo 2½ to 4 inches in diameter. At first it is mottled green in color resembling a watermelon, but upon ripening, it turns to a beautiful yellow. It contains a large number of seeds which should be separated from the pulp before it is used. The fruit is collected in autumn when it begins to turn yellow. It is sometimes dried whole, but more often it is peeled to facilitate drying. The pulp, constituting about ⅔ of the fruit, is dry, soft, spongy and intensely bitter.

Colocynth is a very old medicine, having been cultivated in England since 1551. There are two commercial varieties of colocynth: (*a*) the Turkish, which is peeled, and (*b*) the Mogador, which is unpeeled. The Turkish is the better grade. It is obtained from the maritime plain between the mountains of Palestine and the Mediterranean Sea and is shipped from Jaffa or Trieste. The importation of colocynth for the year 1924 amounted to 65,306 pounds.

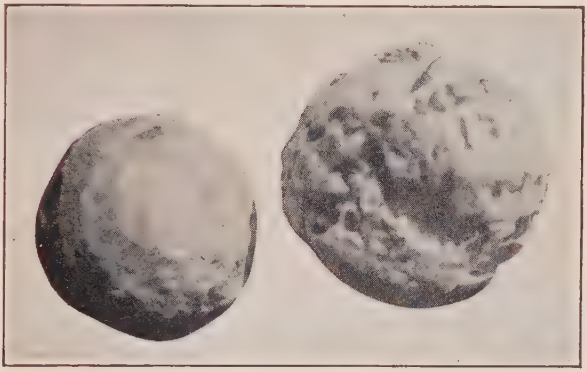


Fig. 96.—Colocynth.

Constituents: Colocynthin, the chief cathartic principle, is an amorphous glucoside; colocynthitin, a resinous substance; pectin.

Properties and Uses: Colocynth is a drastic hydragogue purgative and an hepatic stimulant. It is rarely employed by itself as a cathartic, except in cases where its prompt diuretic action is wanted, as in dropsy, apoplexy, paralysis or coma. It is, however, combined with other drugs as a simple evacuant. Over-doses of colocynth produce profuse vomiting and purging with irritation of the stomach and bowel.

Dose: 1½ gr. (0.1 Gm.).

Official Preparations: U.S.P. X.

Extract of Colocynth, ½ gr. (0.03 Gm.).
Compound Extract of Colocynth, 4 gr. (0.25 Gm.).
Compound Pills of Mild Mercurous Chloride, 2 pills.

ELATERINUM

(ĕl′ȧ-tē′rĭ-nŭm)

ELATERIN—U.S.P.

Source: Ecballium Elaterium (Linné) A. Richard (Fam. Cucurbitaceæ)
Etymology: Ecballium from the Gr. "ek," *out*, and "ballein," *to throw*, referring to the manner in which the ripe fruit ejects its seeds.

Elaterium from the Gr. "elaterion," *driving out*, from "elaynein," *to drive*, referring to the same characteristic.

Part Used: A substance obtained from the juice of the fruit.

Description and Physical Properties: Minute, white scales or prismatic crystals. It is odorless, and is stable in the air.

Elaterin is insoluble in water. One Gm. is soluble in 325 cc. of alcohol, 310 cc. of benzene, 15.5 cc. of chloroform, and in 450 cc. of ether, at 25° C. One Gm. is soluble in 100 cc. of boiling alcohol.

Habitat: Southern Europe, Western Asia, Northern Africa. Cultivated in the United States.

Discussion: The plant producing this drug has a perennial root from which arise several, rough, trailing stems, bearing considerable resemblance to the cucumber vine. The flowers are yellow and proceed from the axils of the leaves. The fruit is shaped like a small cucumber and grows from an inch and a half to 2 inches in length. It is of a greenish color and is thickly covered with sharp spines. It is three-celled and contains a bitter, mucilaginous juice in which there are many seeds. As the fruit ripens, it turns yellow and becomes detached from the stem, leaving, at that point, a thin covering membrane, which is ruptured by the internal pressure and through which the seeds are expelled so violently that they are thrown a considerable distance.

For the preparation of elaterin, the fruit is collected before it is ripe, cut into halves longitudinally and laid on clean wire screens so the juice can run through. The juice thus collected is strained and allowed to stand until the deposit of elaterin settles out. This deposit is then removed and placed on tiles to dry by the aid of a gentle heat. The fruit was employed by the ancients, being recommended by Dioscorides for mania, melancholia, etc. Sydenham (1624–1689) used it in dropsy. It later fell into disfavor because of the severity of its action, but was brought forward again by Dr. Ferriar.

Properties and Uses: Elaterin is the most active of the hydragogue purgatives, producing copious watery evacuations with considerable griping and general depression. Over-doses may cause prostration and acute inflammation of the stomach and bowel. It is said to eliminate urea through the bowel. It is used in dropsy, Bright's disease and congestions of the brain and lungs. On account of its depressant effect, it is not employed where weak or diseased heart is thought to be a factor.

Dose: 1/20 gr. (0.003 Gm.).

PEPO

(pē′pō)

PEPO—U.S.P.

Synonym: Pumpkin Seed.

Source: Cucurbita Pepo Linné (Fam. Cucurbitaceæ).

Etymology: Cucurbita, the Lat. for *gourd*, from "cucumis, cucumeris," *a hollowed-out vessel*, from the Celtic "kukh," *hollow*, and "orbis," *a ring* or *round*, referring to the spherical form of the fruit.

Pepo from the Gr. "pepon," *pumpkin*, meaning *ripe* or *mellow*.

Part Used: The dried, ripe seeds of cultivated varieties.

Description and Physical Properties: *Unground Pepo:* Broadly elliptical or ovate, from 15 to 23 mm. in length and from 2 to 3 mm. in thickness; externally yellowish white, very smooth, occasionally with thin, transparent fragments of adhering pulp and with a shallow groove parallel to and within 1 mm. of the margin; fracture short; seed-coat consisting of a white coriaceous outer layer and a membranous inner layer occasionally of a dark-green color; embryo whitish, straight, with a small conical hypocotyl and 2 plano-convex cotyledons; slightly odorous when contused; taste bland and oily.

Habitat: Southern Asia, Europe, America. Widely cultivated.

Discussion: The pumpkin and its seeds are so familiar to all that any description of the plant here is unnecessary.

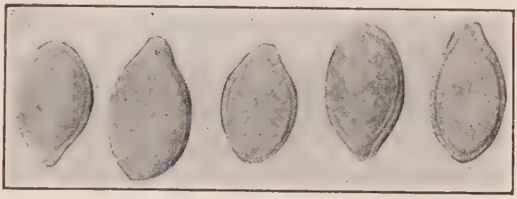


Fig. 97.—Pumpkin seeds.

Constituents: The seeds contain about 40 per cent of a fixed oil and an acrid resin. It is not known what the active principle is.

Properties and Uses: The seed of the pumpkin has long been recognized as a tænifuge, and while it is not as certain in its action as several of the other drugs used for that purpose, its freedom from taste and the mildness of its action are qualities worthy of consideration. In addition to its use against the tapeworm, it is also effective against the roundworm.

Dose: 1 oz. (30 Gm.).

BRYONIA

(brī-ō′nĭ-ȧ)

BRYONIA—N.F.

Synonyms: Bryony; Devil's Turnip.

Source: Bryonia alba Linné and Bryonia dioica Jacquin (Fam. Cucurbitaceæ).

Etymology: Bryonia from the Gr. "bryein," *to swell,* referring to the thick spindle-shaped root.

Alba from the Lat. "albus," *white.*

Dioica from the Lat. "di," *two,* and the Gr. "oikos," *house,* referring to the diœcious flowers, i.e., having the male reproductive organs in one plant and the female in another.

Part Used: The dried root.

Description and Physical Properties: *Unground Bryonia:* Usually in circular or elliptical slices, from 1.5 to 10 cm. wide and from 3 to 15 mm. thick; the edges light gray or yellowish, rough and striate, the cut surface white or faintly yellow, showing a thin cortex and a wood with numerous projecting, collateral fibrovascular bundles arranged in concentric zones; fracture short and mealy, whitish internally. Odor faint but distinct and characteristic; taste bitter and nauseous.

Habitat: Central and Southern Europe.

Discussion: Both of the official species of bryonia are perennial, tendril-climbing vines. Bryonia alba is monœcious and has black berries, while Bryonia dioica is diœcious and bears red berries. The leaves are heart-shaped at the base and have five lobes. The flowers are greenish white or yellowish. The fruit is of the size of a pea. The root is about 2 inches in diameter and from 1 to 2 feet in length. It is collected in the spring and occurs in the market in thin, transverse discs.

Constituents: Bryonin, a bitter glucoside having the formula ($C_{34}H_{48}O_9$); bryonidin, also a glucoside; resin.

Properties and Uses: Bryonia is an active hydragogue cathartic, over-doses producing inflammation of the gastro-intestinal tract with violent purging and vomiting. It is used in dropsy, constipation, dyspepsia and rheumatism.

Dose: 15 gr. (1 Gm.).

Official Preparation: N.F. V.

Tincture of Bryonia, 1 fl. dr. (4 cc.).

CHAPTER LXXVI

RUBIACEÆ

(ro͞o′bĭ-ā′sė̆-ē)

MADDER FAMILY

This is a very large family, consisting for the most part, of tropical herbs, shrubs and trees. It numbers about 400 genera and 4500 species. While they are most abundant in tropical countries, a few representatives are found in the United States and other temperate regions. The leaves are usually opposite and entire, the flowers perfect and the fruit a capsule, berry or drupe.

IPECACUANHA

(ĭp′ė̄-kăk′ū̇-ăn′ȧ)

IPECAC—U.S.P.

Synonyms: Rio Ipecac; Brazilian Ipecac; Cartagena Ipecac; Panama Ipecac.

Source: Cephaëlis Ipecacuanha (Brotero) A. Richard, known in commerce as "*Rio*" or "*Brazilian*" Ipecac, or Cephaëlis acuminata Karsten, known in commerce as "*Cartagena*" or "*Panama*" Ipecac (Fam. Rubiaceæ).

Etymology: Ipecac and ipecacuanha come from the Brazilian name of the plant, "ipecaaguen," which means, literally, "smaller, road-side sick-making plant," i.e., a small plant growing by the road that produces nausea.

Cephaëlis from the Gr. "kephale," *a head*, and "eilo," *to collect*, i.e., the flowers are arranged in capitula or "*heads*."

Acuminata from the Lat. "acuminatus," *pointed* or *acute*, referring to the apex of the leaves.

Part Used: The dried rhizome and roots, which must contain not less than 1.75 per cent of ether-soluble alkaloids of ipecac.

Description and Physical Properties: *Unground Rio Ipecac:* Roots in cylindrical pieces, mostly curved and sharply flexuous, occasionally branched, from 3 to 15 cm. in length, from 1 to 4 mm. in thickness, reddish brown to dark brown, either smooth or closely annulated, with thickened, incomplete rings and usually exhibiting transverse fissures with vertical sides; bark of smooth root thin, approximately one-ninth of the diameter of the root, that of the annulated root approximately two-thirds of the entire diameter; fracture of bark short, easily separable from the tough, fibrous wood; odor distinctive, the dust sternutatory; taste bitter, nauseous and acrid. Rhizomes cylindrical, attaining a length of 10 cm. and a thickness of 2 mm., finely longitudinally wrinkled, with a few elliptical scars and a distinct pith approximately one-sixth of the entire diameter.

HABITAT: Brazil, Bolivia, Colombia. Cultivated in India.

DISCUSSION: Cephaëlis Ipecacuanha is a small shrubby plant with several procumbent stems 2 or 3 feet in length arising from the same root. The root is very small and thickly covered with annular wrinkles. The small, white flowers are arranged, to the number of twelve or more, in semi-globular capitulums or "*heads.*" The fruit is an ovate berry, purplish at first, but becoming almost black when ripe. It flourishes in moist, shady woods, being more abundant between the 18th and 20th parallels of South Latitude. It blooms in January and February and ripens its fruit in May. The root is active in all seasons, but is collected, for the most part, during the dry season in order to facilitate drying.

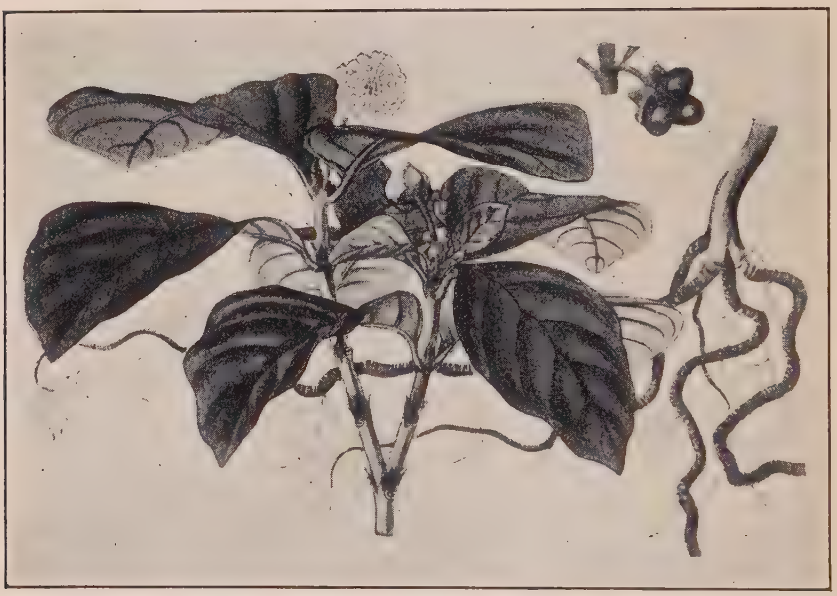


FIG. 98.—Ipecac, flowering top, also rhizome and roots. (Courtesy of Parke, Davis & Company.)

Cephaëlis acuminata can usually be distinguished by its thicker roots, lighter color and the fact that many of its roots are but little, if at all, annulated. However, many of the samples of this variety can not be told with certainty from the Rio ipecac. In 1924, 76,627 pounds of ipecac were imported.

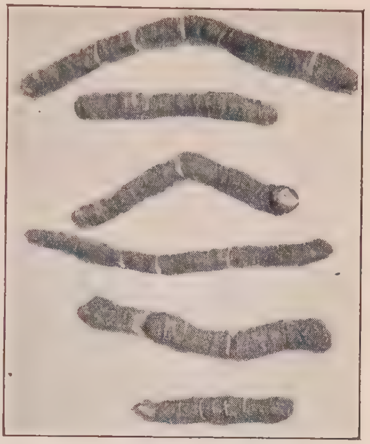


Fig. 99.—Ipecac rhizomes.

Constituents: Total alkaloids, 2 to 3.5 per cent, consisting of emetine, about 1½ per cent; cephaëline, 0.5 per cent in Rio and 0.9 per cent of emetine and 1.2 per cent of cephaëline in Cartagena ipecac; psychotrine; ipecacuanhic acid, 2.25 per cent. Cephaëline is about twice as strong as emetine, the two representing the activity of the drug. Ipecacuanhic acid (cephaëlic acid) is an amorphous, bitter glucoside, once believed to be identical with gallic acid, but more closely resembling caffeo-tannic acid.

Properties and Uses: The two most important actions of ipecac are those of nauseating expectorant and emetic. For these it is employed in a variety of conditions. As an expectorant it is used in the acute stages of bronchitis and in asthma, whooping cough and pneumonia. It is given for its emetic action in bilious sick-headache and acute indigestion to empty the stomach. Also in spasmodic croup in children to produce vomiting so as to draw the phlegm and mucus out of the air passages. Its emetic action is due to an irritation of the walls of the stomach (local emetic) and possibly in large doses also to a direct stimulant action on the vomiting center of the brain (general emetic). Although its action is fairly prompt, usually acting in fifteen to thirty minutes, it is neither violent nor depressing.

Ipecac has found extensive use in the treatment of amœbic dysentery but the treatment was not entirely satisfactory because of the nausea induced by the large doses of the crude drug that were required. Since the hypodermic use of emetine came into vogue that alkaloid has been employed to destroy the amœbæ. It is given in doses of ½ to ¾ gr. in amounts of one to two grains per day.

Some years ago the injection of emetine was advocated for the cure of pyorrhea alveolaris. It was and still is used in various dental preparations although the profession has long since abandoned its use for this purpose.

Dose: Expectorant, 1 gr. (0.06 Gm.).
Emetic, 15 gr. (1 Gm.).

Official Preparations: U.S.P. X.

Fluidextract of Ipecac, Expectorant, 1 m. (0.06 cc.).
Emetic, 15 m. (1 cc.).
Powder of Ipecac and Opium, 5 gr. (0.3 Gm.).
Syrup of Ipecac, Expectorant, 12 m. (0.75 cc.).
Emetic, 4 fl. dr. (15 cc.).

CINCHONA

(sĭn-kō′nȧ)

CINCHONA—U.S.P.

Synonyms: Peruvian Bark; Calisaya Bark; Jesuit's Bark; Yellow Cinchona; Red Peruvian Bark; Saint Ann's Bark; Red Cinchona.

Source: Cinchona succirubra Pavon or of its hybrids, known in commerce as "*Red Cinchona*," or of Cinchona Ledgeriana Moens, Cinchona Calisaya Weddell and of hybrids of these with other species of Cinchona, known in commerce as "*Calisaya Bark*" or "*Yellow Cinchona*" (Fam. Rubiaceæ).

Etymology: Cinchona from "Chinchon," named for Countess Ana de Osorio, the wife of Count Chinchon, Viceroy of Peru. She is claimed to have been cured of tertian fever by this bark in 1638, its administration having been recommended by a Jesuit priest.

Calisaya is the Spanish and native Indian name of the bark, from "colli," *remedy*, and "salla," *stony ground*, hence more properly "collisalla," i.e., a remedy growing on stony ground.

Succirubra from the Lat. "succus," *juice*, and "ruber," *red*, because the sap turns red on exposure to the air.

Part Used: The bark, which must contain not less than 5 per cent of alkaloids of cinchona.

Description and Physical Properties: *Unground Cinchona:* In quills or curved pieces or in broken fragments; bark from 2 to 8 mm. in thickness; externally brown or reddish brown, usually with white or gray lichens, more or less roughened with corky ridges or protuberances, and with transverse fissures, rarely numerous or much intersected and having their sides sloping (Red Cinchona), or with numerous intersecting transverse and longitudinal fissures having nearly vertical sides (Yellow Cinchona); inner surface brown or reddish brown and striate; fracture short and granular in the outer bark, rather splintery in the inner bark; odor faintly aromatic; taste astringent and very bitter.

Habitat: South America. Cultivated in Jamaica, India, Java, Ceylon and West Africa.

Discussion: No less than thirty-six species of cinchona have been classified, and bark is collected from any of them that will yield a paying quantity of alkaloids. The original home of cinchona was on the eastern slope of the tropical Andes, extending from the 19th parallel, South Latitude, on the central chain, northward to 2° South Latitude, where a second belt commences on the eastern slope of the western chain, thence northward into Colombia to the 10th parallel, North Latitude. It may thus be seen that the original home of cinchona was restricted to a narrow belt about 2000 miles long, and as we shall presently see, is also limited in altitude.

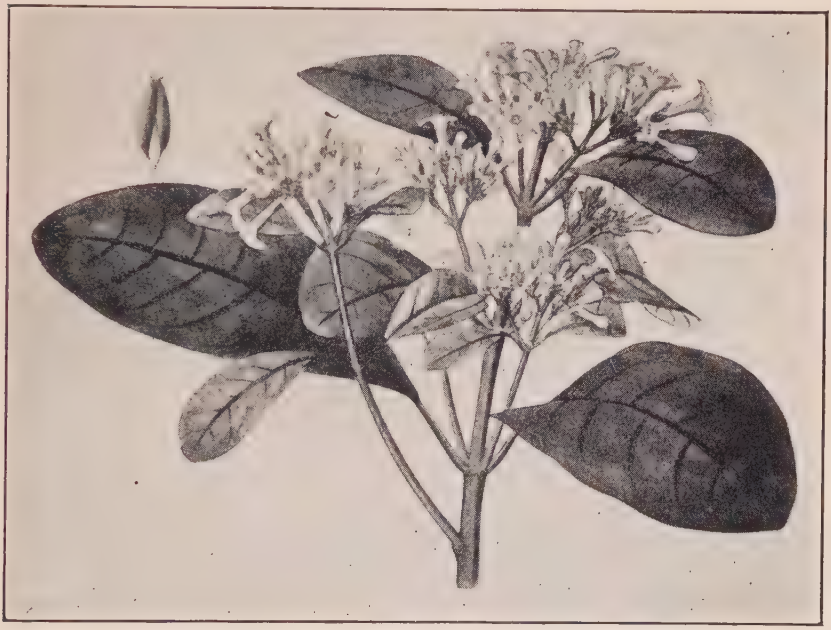


FIG. 100.—Cinchona Calisaya. (Courtesy of Parke, Davis & Company.)

Cinchona trees are evergreen, growing from 40 to 75 feet in height and from 1 to 2 feet in diameter. The leaves are laurel-like and pinkish in color on the under surface. The most valuable specimens of yellow cinchona grow at an altitude of from 5000 to 8000 feet, while those of the red cinchona grow at about 2000 feet. Inferior and almost worthless specimens of the yellow cinchona are found as high as 11,600 feet, and as low as 3000 feet. The average temperature of this region is 55° F. and the atmosphere is damp and foggy throughout the greater part of the year. The cinchona forests are typically tropical, presenting a mixture of rank ferns, bamboos, orchids and climbing vines.

The early method of collecting the bark was to cut down and uproot the tree and remove the bark from the entire tree, thus killing it, but as the medicinal value of cinchona became better known, the demand for it increased to such an extent that more economical methods were employed. Also the plants have been cultivated in other countries where topographical, climatic and other conditions are similar, and with such a degree of success that the product of the cultivated trees now far exceeds that of the native forests of South America.

The method of coppicing is practiced extensively because it affords a large yield of bark and does not immediately kill the tree. This consists of chopping down the tree and peeling off all of its bark from trunk and branches. The shoots that spring up from the stump are thinned out and but two or three allowed to remain. When these have attained the proper size they are cut off and peeled completely. A second set of shoots is permitted to develop. These, in turn, are cut down, the stump uprooted and stump and branches denuded of all of their bark.

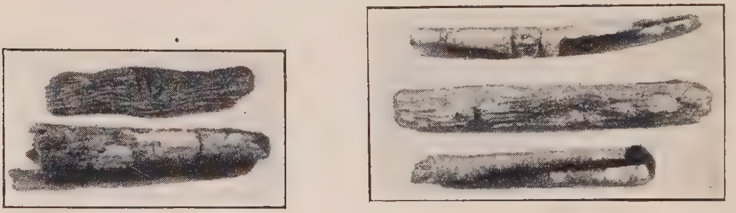


FIG. 101.—Left, Yellow Cinchona. Right, Red Cinchona. $\frac{1}{3}$ size.

There are now a number of scientific methods of collecting the bark, but the two which seem to be the best are employed in India. The first is known as the "*shaving process*" and is done with knives made of brass in order to prevent discoloration of the bark. In this method the outer bark is removed only to the liber. The second method is known as the "*mossing method*" and consists of removing alternate strips of bark from the tree each year and binding moss over the exposed areas to protect them. This gives an annual yield of rich bark, the newer bark being the richer in alkaloids. The importation statistics on cinchona and its alkaloids are very interesting and indicate the enormous quantities of these products in use. The figures for 1924 follow:

(*a*) Cinchona bark, 2,395,704 pounds.
(*b*) Crude quinine, 329,392 ounces.
(*c*) Quinine sulphate, 1,210,086 ounces.
(*d*) Quinine alkaloid, 117,700 ounces.

(*e*) Other salts and derivatives of quinine, 347,570 ounces.
(*f*) Cinchonidine and its salts, 585,648 ounces.
(*g*) Cinchonine and its salts, 36,844 ounces.
(*h*) Quinidine and its salts, 408,404 ounces.
(*i*) Other salts and alkaloids derived from cinchona bark, 216,027 ounces.

CONSTITUENTS: Quinine, $C_{20}H_{24}N_2O_2$; quinidine, $C_{20}H_{24}N_2O_2$, isomeric with quinine; cinchonine and cinchonidine, both isomers having the formula $C_{19}H_{22}N_2O$; quinamine; chinoidine, etc., there being from 20 to 30 alkaloids present. Quinic and cinchotannic acids are also present. Chinoidine is a mixture of amorphous alkaloids resulting from the evaporation and purification of the mother liquors after the removal of the crystallizable alkaloids. It comes in the form of black or almost black sticks or masses. While it was used extensively in the past it is in little demand now.

PROPERTIES AND USES: Two properties—tonic and antimalarial—are outstanding and characterize the action of cinchona. As a tonic it sharpens the appetite and promotes digestion by stimulating the flow of the saliva and gastric juice and increasing the peristaltic action of the stomach. It is used in atonic dyspepsia, enlarged spleen and to increase the appetite in convalesence from wasting disease. Quinine represents the action of cinchona in periodic (malarial) fevers and is the most powerful of its alkaloids in this direction. In fact, quinine is specific for malarial fever, entering the blood and acting as a direct poison to the parasites (three species of plasmodium) which are transmitted to the human by the bite of the anopheles mosquito. The parasites of malaria enter the red blood corpuscles in which they multiply and which they leave in enormous numbers to attack new red cells to obtain lodgment in them. As they leave the corpuscles fever develops which abates as they enter new cells. It is during the period in which the plasmodia are floating free in the blood plasma that they are most susceptible to the destructive action of quinine and the administration of the alkaloid should be so timed that it will be circulating in the blood at the time the spores are liberated, a process that recurs at regular intervals. To accomplish this a dose of quinine is given some three or four hours before the expected attack or a large dose of 15 gr. (1 Gm.). or several smaller ones may be given during the recession of the fever. The intention is to destroy as many of the invading host as possible in order to avert another paroxysm of fever. As some parasites survive each dose of quinine, they may multiply and in time have a sufficiently numerous progeny to cause renewed fevers, the medication with quinine must be methodical and persistent, continuing over a period of several weeks in order to destroy all of the organisms of the disease.

Quinine is a very effective prophylactic against malaria. For this purpose it is given in 15 gr. doses on two successive days and repeated after a week or ten days; or 3 to 5 gr. may be given daily with an additional dose of 10 gr. once during a week.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATIONS: U.S.P. X.
Fluidextract Cinchona, 15 m. (1 cc.).
Tincture of Cinchona, 1 fl. dr. (4 cc.).
Compound Tincture of Cinchona, 1 fl. dr. (4 cc.).

GAMBIR

(găm′bĭr)

GAMBIR—U.S.P.

SYNONYMS: Catechu; Pale Catechu; Cutch; Terra Japonica.

SOURCE: Ourouparia Gambir (Hunter) Baillon (Fam. Rubiaceæ).

ETYMOLOGY: Gambir is the native Malayese name of the plant.
Ourouparia (o͞o′ro͞o-pā′rĭ-ȧ) is a native name derived from the Gr. "oura," *tail,* and "paria," *a large drum,* referring to the seeds, which are tailed at both ends.

PART USED: A dried aqueous extract prepared from the leaves and twigs.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Gambir:* Masses approximately cubical or rectangular, from 20 to 30 mm. in diameter; externally pale grayish brown to reddish brown, more or less dull and porous; friable, internally of a light brown or dark gray color; inodorous; taste bitterish and very astringent.

HABITAT: India, Malacca, Sumatra, Cochin China.

DISCUSSION: The plant from which gambir is obtained is a slender climbing shrub. The flowers occur in dense globular heads which are borne on long peduncles springing from the axils of the leaves. About midway on the peduncle is borne a whorl of bracts. After the falling of the infloresence the peduncle breaks off at this point, the lower portion becoming elongated and curved into hooks by means of which the plant climbs upon neighboring objects.

The natives prepare the gambir by collecting the leaves and twigs of the plant, chopping them into small pieces and placing them in boiling water. The boiling is continued for about six hours, after which it is subjected to straining and evaporation and the thickened extract poured into small wooden tubs. When sufficiently cooled to admit the hand, the thickened mass is stirred with a piece of wood of cylindrical shape held in the hand. The mass solidifies and is then cut into cubes and smoked to assist the drying. In 1925, 3,881,192 pounds of gambir were imported.

Constituents: Gambir contains from 26 to 38 or even 50 per cent of catechu-tannic acid and from 20 to 29 per cent of catechin, $C_{15}H_{14}O_6$ (catechuic acid); quercetin, $C_{15}H_{10}O_7$, and catechu red.

Properties and Uses: On account of the large amount of tannin present, gambir is astringent and is used in diarrhea, chronic sore throat, hemorrhages and ulcers. It is used in a limited way as an ingredient of mouth washes for relaxed conditions of the mucous membranes, spongy gums, etc. It is most largely employed in the arts as a mordant in dyeing and in the manufacture of leather.

Dose: 15 gr. (1 Gm.).

Official Preparation: U.S.P. X.

Compound Tincture of Gambir, 1 fl. dr. (4 cc.).

MITCHELLA

(mĭ-chĕl′ȧ)

MITCHELLA—N.F.

Synonyms: Squaw Vine; Partridge Berry.

Source: Mitchella repens Linné (Fam. Rubiaceæ).

Etymology: Mitchella, named in honor of John Mitchell, an American botanist (d. 1768).

Repens from the Lat. "repo," *to creep,* or *crawl,* i.e., the stems trail upon the ground.

Part Used: The dried plant, containing not more than 5 per cent of foreign matter.

Description and Physical Properties: *Unground Mitchella:* In loosely matted masses consisting of much-branched rhizomes with their fine roots together with the stems and leaves; rhizomes light yellowish to dark brown; filiform, with slender fibrous roots; stems quadrangular or flattened, light green with surface finely striated, bearing opposite leaves; leaves green, coriaceous, opposite, rounded ovate, entire up to about 2 cm. in length and with a short petiole, upper surface smooth, dark green with prominent midrib and veins, lower surface smooth, light and somewhat shiny. Odor faint; taste slightly bitter.

Habitat: North America from Nova Scotia to Florida and westward as far as Minnesota.

Discussion: Mitchella is a trailing, evergreen herb. Its round ovate leaves are variegated with whitish lines. The white, sweet-scented flowers are dimorphic and occur in pairs. They are followed in fruit by scarlet, berry-like fruits which remain on the vine throughout the winter. These are eaten by partridges, hence the common name.

Constituents: Resin, wax, mucilage and perhaps a saponin-like body.

Properties and Uses: This drug is said to have been employed by the native Indians as a parturient. It has also been administered in the form of a decoction as a tonic, alterative and diuretic. Its present use is confined practically to that of an emmenagogue.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Compound Elixir of Aletris, 1 fl. dr. (4 cc.).
Compound Elixir of Helonias, 1 fl. dr. (4 cc.).
Fluidextract of Mitchella, 30 m. (2 cc.).

COFFEA TOSTA

(kŏf′ē-ȧ tōs′tȧ)

COFFEE—N.F.

Synonym: Roasted Coffee.

Source: Coffea arabica Linné or Coffea liberica Bulliard (Fam. Rubiaceæ).

Etymology: Coffea, a Latinized form of "*coffee*," from "Coffee," a province in Africa where the plant grows abundantly.

Arabica, the Lat. for "*Arabian*," i.e., of or pertaining to Arabia, its habitat.

Liberica, the Lat. for "*Liberian*," i.e., of or pertaining to Liberia.

Part Used: The seeds which have been roasted until they develop a dark-brown color and a characteristic aroma. They are required by the National Formulary to contain not less than 1 per cent of caffeine.

Description and Physical Properties: *Unground Coffee:* Oval, of variable size, having one side strongly convex, the other flat with a longitudinal groove, and showing traces of the papery seed-coat in the cleft. It has a characteristic aroma and a pleasantly bitter taste.

Habitat: Arabia, Ceylon, Mocha, Abyssinia. Cultivated in Brazil, Central America, Guatemala, Hawaii, Java, Arabia, Mexico and the West Indies.

Discussion: The coffee plant is a small evergreen tree growing from 10 to 20 feet in height and resembling somewhat our common cherry tree. Since it grows best in the shade, it is planted in forests of other trees which have been thinned out enough to admit the proper amount of sunlight, or if no forests are available, other rapidly growing trees are planted at the proper intervals on the coffee plantations. The trees are evergreen with ovate, glossy, coriaceous leaves. The flowers are small, white, funnel-shaped and occur in cymes. The fruit is a scarlet drupe about the size of a cherry, each containing two seeds which are enclosed in a papery membrane. On ripening, the fruit becomes a dark purple and dehisces, liberating the seeds, which constitute most of its bulk.

There are four principal commercial varieties of coffee as follows:

(1) *Mocha:* This variety is named after the place of its production, i.e., the region about the City of Mocha in Arabia. Although the smallest in size of kernels, it is considered the best.

(2) *Java:* This variety is named after the Island of Java, but is grown in Ceylon as well. It is the largest in size of kernels.

(3) *Rio* or *Brazilian*: This is a coffee of very variable quality grown on the hasciendas of Brazil. According to Oriental judgment, the coffee used in the United States (mostly from Brazil) is the poorest of all.

(4) *Liberian:* These are large kernels of fine flavor, grown in Liberia.

The importation of coffee in 1925 amounted to 1,283,695,102 pounds and its declared valuation at the ports was $286,234,741.

Constituents: Caffeine, 1 to 2 per cent, is the principal constituent of coffee; but caffeol, $C_8H_{10}O_2$, an empyreumatic, aromatic oil; fat, sugar and tannin are also present. The last three constituents are to some extent destroyed in the process of roasting. During this same process, however, there is formed the volatile substance, caffeol, that gives to good coffee its specific flavor and aroma.

Properties and Uses: Probably most of the therapeutic properties of coffee can be ascribed to the caffeine present, but this is not entirely so since the administration of a corresponding amount of the alkaloid will not yield the same results as a good cup of coffee. Coffee is both stimulant and tonic. It improves the appetite, aids digestion and tones up the general system. The heart action is quickened, the respiration increased and a general sense of well-being established. Caffeine stimulates the cerebrum and increases the mental alertness and intellectual powers for the time being. Hot coffee is a valuable stimulant in neuralgia and sick-headache. Also as an antidote to opium narcosis and general torpor of the nervous centers.

Dose: Coffee, roasted, 30 gr. (2 Gm.).
Caffeine is administered in doses of from 3 to 10 gr. (0.2 to 0.6 Gm.).

Official Preparation: N.F. V.
Fluidextract of Coffee, 30 m. (2 cc.).

CHAPTER LXXVII

CAPRIFOLIACEÆ

(kăp′rĭ-fō′lĭ-ā′sē̇-ē)

HONEYSUCKLE FAMILY

This is a small family containing about 10 genera and 260 species. They are found for the most part in the northern hemisphere. They are perennial herbs, shrubs, woody climbers or small trees, and have opposite, simple, or pinnately compound, leaves. The flowers are often showy with five stamens borne on the 5-lobed corolla. The fruit is a drupe, berry or capsule.

VIBURNUM OPULUS

(vī-bûr′nŭm ŏp′ū̇-lŭs)

VIBURNUM OPULUS—N.F.

Synonyms: Cramp Bark; Squaw Bush; High-bush Cranberry; Cranberry Tree; Rose Elder; Marsh Elder; Water Elder; Snowball Bush.

Source: Viburnum Opulus Linné, var. americanum (Miller) Aiton (Fam. Caprifoliaceæ).

Etymology: Viburnum from the Lat. "viere," *to weave* or *plait*, referring to the pliability of the branches.

Opulus was the old name of the maple, the leaves of which are similar to those of this plant.

Caprifoliaceæ from the Lat. "caper," *a goat*, and "folium," *leaf*.

Part Used: The dried bark.

Description and Physical Properties: *Unground Viburnum Opulus:* In strips, or occasionally in quills or chip-like fragments, the bark attaining a thickness of 3 mm.; outer surface of the thinner pieces of a light gray color with crooked, longitudinal, purplish brown stripes and very small brown lenticels, the thicker pieces purplish red or occasionally blackish, except when very young, and more or less finely fissured or thinly scaly; inner surface varying in color from yellowish to rusty brown, with very short oblique striæ, except where the outer wood layer adheres; fracture short and weak, the fractured surface mostly whitish, varying to pale brown in the inner layer, rusty brown in the outer layer, covering the green tangential layer of phelloderm. Odor slight and characteristic; taste mildly astringent and decidedly bitter.

HABITAT: North America.

DISCUSSION: Viburnum Opulus is a large shrub, often reaching 10 feet in height. The leaves are 3- to 5-ribbed and 3-lobed. The flowers are small and white, occurring in peduncled cymes. The fruit is a roundish drupe, light red in color, and contains a flat orbicular stone. The bark is thick, grayish-brown, longitudinally wrinkled, with large brown lenticels and often showing the brownish-black fruit-heads of a lichen. Viburnum Opulus has been grossly adulterated with Acer spicatum designated by the names "mountain maple" or "false cramp-bark." In fact the U.S.P. VIII described the latter under the title Viburnum Opulus. The substitution can be easily detected by the following differences: Acer spicatum breaks with a shorter fracture than true cramp-bark and possesses no odor of valeric acid. There is a difference in the color reactions produced by the tannic acid of the two barks upon the application of solutions of iron salts, blue resulting from the false and green from the true cramp bark.

CONSTITUENTS: Viburnin, a whitish or greenish-yellow bitter principle of a resinous nature; valeric acid (valerianic acid) resin; tannin.

PROPERTIES AND USES: This drug came into extensive use about 50 or 60 years ago as an "excellent uterine sedative." Its value does not appear to have been demonstrated and it has fallen from favor with medical men. Some of the best of the modern textbooks on pharmacology and therapeutics do not as much as mention the name of the drug.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Elixir of Aletris, 1 fl. dr. (4 cc.).
Compound Elixir of Helonias, 1 fl. dr. (4 cc.).
Compound Elixir of Viburnum Opulus, 1 fl. dr. (4 cc.).
Fluidextract of Viburnum Opulus, 30 m. (2 cc.).
Compound Tincture of Viburnum, 1 fl. dr. (4 cc.).

VIBURNUM PRUNIFOLIUM
(vī-bûr′nŭm prŭ-nĭ-fō′lĭ-ŭm)

VIBURNUM PRUNIFOLIUM—N.F.

SYNONYMS: Black Haw; Stag Bush; Sheep Berry; Sweet Viburnum.

SOURCE: Viburnum prunifolium Linné (Fam. Caprifoliaceæ).

Etymology: Viburnum from the Lat. "viere," *to weave* or *plait*, referring to the pliability of the branches.

Prunifolium from the Lat. "prunum," *plum*, and "folium," *leaf*, because the leaves resemble those of the plum tree.

Part Used: The dried root bark.

Description and Physical Properties: *Unground Viburnum Prunifolium:* In irregular, transversely curved or quilled pieces, from 1.5 to 6 cm. in length, and from 0.5 to 1.5 mm. in thickness; outer surface grayish brown, or, where the outer cork has scaled off, brownish red, longitudinally wrinkled; inner surface reddish brown, longitudinally striated; fracture short but uneven, showing in bark which is young or of medium thickness, a dark brown cork, a brownish red outer cortex, and a whitish inner bark in which are numerous light-yellow groups of cells. Odor strong, sourish; taste distinctly bitter and somewhat astringent.

Habitat: Europe, United States.

Discussion: Viburnum prunifolium is a small, handsome shrub, flowering in May and ripening its fruit in early autumn. The leaves are acuminate and sharply serrulate and stand on long slender petioles. The white flowers occur in sessile cymes from 2 to 5 inches in breadth. The fruit is an ovoid, or oblong, blackish drupe. The bark is thick and of a rust-brown color, slightly fissured and somewhat scaly. The odor is slight, but peculiar and the taste very bitter.

Constituents: Viburnin; resin; tannin; valeric acid.

Properties and Uses: See Viburnum Opulus.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Elixir of Viburnum Prunifolium, 1 fl. dr. (4 cc.).

Fluidextract of Viburnum Prunifolium, 30 m. (2 cc.).

SAMBUCUS

(săm-bū'kŭs)

SAMBUCUS—N.F.

Synonyms: Elder Flowers; Sweet Elder; Black Elderberry.

Source: Sambucus canadensis Linné, or Sambucus nigra Linné (Fam. Caprifoliaceæ).

Etymology: Sambucus, the Lat. for *elder tree*.

Canadensis, *of* or *pertaining to Canada*, i.e., its habitat.

Nigra from the Lat. "niger," *black*, referring to the color of the berries.

Part Used: The air-dried flowers.

Description and Physical Properties: Small, from 2 to 3 mm. in width, shriveled; calyx superior, five-lobed; corolla cream colored to brownish yellow, rotate, flat or slightly campanulate, regularly five-lobed; stamens five, inserted at the base of the corolla and alternating with its lobes, filaments slender, anthers oblong, yellow; pollen ellipsoidal or tetrahedral and rounded, covered with finely punctate markings, having three pores and up to 0.023 mm. in diameter. Odor faintly sweet and aromatic; taste slightly bitter.

HABITAT: North America.

DISCUSSION: The common elder, Sambucus Canadensis, is a perennial shrub growing from 5 to 10 feet in height and forming large clumps along the banks of streams or in moist places in the edges of woods and thickets. It spreads by means of long root-like rhizomes running under the ground in every direction. The stems are divided into segments by nodes or "*joints*" which become closer together as they approach the top of the stem. The bark is a rough-gray in color and highly odorous. The wood zone is quite thin and encloses a white pith which occupies about three-fourths of the diameter of the stem. The large, opposite leaves are pinnately divided and have from seven to eleven pointed, serrate leaflets arranged on a long petiole. The European plant, S. nigra, attains the proportions of a small tree. The flowers of both sources are creamy-white in color and very fragrant. They occur in large, flat-topped, compound cymes. They are followed by purplish-black, juicy fruits arranged in a similar manner. The flowers should be gathered and carefully dried as soon as they are fully opened. They appear in the market as a yellowish or yellowish-brown mass of shriveled flowers.

CONSTITUENT: The flowers contain about ½ per cent of volatile oil which is recovered by steam distillation. It is a yellow or greenish-yellow, butter-like mass and is separated from the water distillate on the addition of salt. It has a very strong odor and a bitter taste.

PROPERTIES AND USES: Elder flowers are held to possess some diaphoretic and diuretic properties. They are little used, however, except as a household remedy. Made into a hot poultice, they impart heat and moisture the same as any other substance of this class.

DOSE: 60 gr. (4 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Compound Fluidextract of Stillingia, 30 m. (2 cc.).
Laxative Species, 20 gr. (1.3 Gm.).
Compound Syrup of Stillingia, 1 fl. dr. (4 cc.).

CHAPTER LXXVIII

VALERIANACEÆ

(vȧ-lē′rĭ-ȧ-nā′sḗ-ē)

VALERIAN FAMILY

This family comprises 8 genera and about 275 species, all of which are herbaceous. They are indigenous, for the most part, to the northern hemisphere. The leaves are opposite, the flowers small and mostly cymose and the fruits dry and indehiscent. Secretion cells, having suberized walls and containing volatile oils, are present.

VALERIANA

(vȧ-lē′rĭ-ā′nȧ)

VALERIAN—U.S.P.

Synonyms: Common Valerian; Garden Valerian; Cat's Valerian; Wild Valerian.

Source: Valeriana officinalis Linné (Fam. Valerianaceæ).

Etymology: Valeriana from the Lat. "valere," *to be strong*, referring to the medicinal virtues of the plant.

Officinalis from the Lat. "officina," *a work-shop* or *store*, from "opus," *work*, and "facere," *to do*, referring to the fact that it was kept for sale.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Valerian:* Rhizome upright, from 2 to 4 cm. in length, and from 1 to 2 cm. in diameter, usually cut longitudinally into 2 to 4 pieces; externally yellowish brown or dark brown, upper portion with stem bases and frequently with a short horizontal branch or stolon, and from the outer surface arise numerous slender, brittle roots; fracture of rhizome short and horny; internally light brown, with a thick bark and narrow central cylinder; odor of valeric acid, becoming stronger upon aging; taste sweetish, camphoraceous and somewhat bitter.

Habitat: Europe, Northern Asia. Naturalized in eastern United States. Cultivated in England, Germany, Belgium and New York State.

Discussion: Valerian is a handsome, perennial, herbaceous plant with an erect stem growing from 2 to 4 feet in height and terminating in many flowering branches. The leaves are opposite and pinnately divided. Those on the stems are attached by means of short, broad sheaths, while the radical ones are larger and stand on long footstalks. The flowers are white or rose colored and occur in terminal corymbs. The fruit, a capsule, contains a single oblong, ovate seed. During the year 1924, 68,480 pounds of valerian were imported.

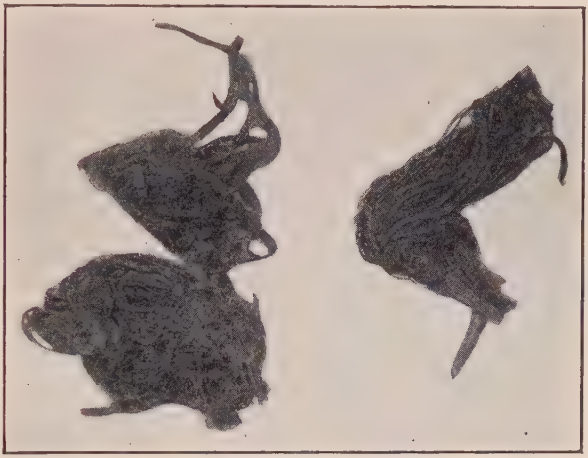


Fig. 102.—Valerian.

Constituents: Volatile oil of pale-greenish color, 0.5 to 2 per cent; formic, malic and acetic acids. The volatile oil contains valeric acid.

Properties and Uses: Valerian is used for its anodyne and antispasmodic properties in a number of nervous conditions, as hysteria, whooping-cough, nervous coughs, nervous unrest, hypochondriasis and neuralgic pain. Whether valerian really induces any favorable changes or whether they are attributable to psychic effects of the unpleasant-smelling valeric acid is open to question.

Dose: 12 gr. (0.75 Gm.).

Official Preparations: U.S.P. X.

Tincture of Valerian, 1 fl. dr. (4 cc.).

Ammoniated Tincture of Valerian, 30 m. (2 cc.).

CHAPTER LXXIX

COMPOSITÆ

(kŏm-pŏz′ĭ-tē)

COMPOSITE FAMILY

This family consists of about 10,000 species and is the largest among the phanerogams. Its members are widely distributed and are mostly herbaceous. The distinguishing feature consists of the fact that the infloresence is a composite head called a "*capitulum*," containing one or two kinds of flowers arranged on a common torus, and provided with a number of bracts forming an involucre. The individual flowers are called "*florets*" and may be hermaphroditic or pistillate, monœcious, diœcious or neutral.

EUPATORIUM

(ū′pȧ-tō′rĭ-ŭm)

EUPATORIUM—N.F.

Synonyms: Boneset; Thoroughwort; Indian Sage; Sweating Plant; Ague-weed; Joe Pye; Feverwort; Crosswort; Vegetable Antimony.

Source: Eupatorium perfoliatum Linné (Fam. Compositæ).

Etymology: Eupatorium from the Gr. "eu," *well*, and "pater," *father*, signifying *well-fathered*, i.e., of noble birth; named for Mithridates Eupator, King of Pontus (123 to 64 B.C.), who discovered one of the species.

Perfoliatum from the Lat. "per," *through*, and "folium," *leaf*, i.e., the leaves are opposite and joined at the base, causing the stem to appear as passing up through the leaf.

Compositæ from the Lat. "compositus," *made up of parts*, from "com," a prefix derived from the Lat. preposition "cum," *with* or *together*, and "ponere," *to place*, referring to the many florets composing the flower head.

Thoroughwort from "through" and "wort," *a plant*, i.e., the stem appears to pass through the leaf.

Part Used: The dried leaves and flowering tops.

Description and Physical Properties: *Unground Eupatorium:* Usually more or less broken; leaves opposite, the pair united at the base, from 8 to 20 cm. long and from 1.5 to 5 cm. in width, tapering regularly from near the base to an acute apex, crenate-serrate, rugosely veined, rough and bright green above, yellowish gray-green, tomentose and resinous-dotted beneath; flower-heads small, numerous, corymbed, with a campanulate involucre of lance-linear, imbricated scales and with from 10 to 15 tubular yellowish-white florets having a bristly pappus in a single row. Odor faintly aromatic; taste strongly bitter.

Habitat: From Canada to Florida and westward as far as Nebraska and Texas.

Discussion: Eupatorium is a perennial, herbaceous plant with several erect stems from 2 to 4 feet in height, branching near the top, each branch terminating in a corymb of small, yellowish-white flowers. In many localities boneset becomes a troublesome weed since its seeds are produced in great numbers and are carried for long distances by the wind.

Constituents: Eupatorin, a bitter glucoside; resin; volatile oil. The Eclectic resinoid, "*eupatorin,*" is entirely different, being the precipitate resulting from pouring a concentrated alcoholic tincture into water.

Properties and Uses: A hot infusion of eupatorium acts as a diaphoretic and diuretic and is employed in household medicine to break up a cold. The same treatment is serviceable in bronchitis and muscular rheumatism. On account of the bitter taste of the drug, it acts as a bitter tonic.

Dose: 30 gr. (2 Gm.).

Official Preparation: N.F. V.

Fluidextract of Eupatorium, 30 m. (2 cc.).

GRINDELIA

(grĭn-dē′lĭ-ȧ)

GRINDELIA—N.F.

Synonyms: California Gum Plant; Broad-leaved Gum Plant.

Source: Grindelia camporum Greene, Grindelia cuneifolia Nuttall, or Grindelia squarrosa (Pursh) Dunal (Fam. Compositæ).

Etymology: Grindelia was named for D. H. von Grindel, an apothecary and botanist of Riga (1776 to 1836).

Camporum from the Lat. "campanula," *a little bell,* from "campana," *a bell,* referring to the shape of the flowers.

Cuneifolia from the Lat. "cuneus," *a wedge*, and "folium," *leaf*, i.e., wedge-shaped leaves.

Squarrosa from the Lat. "squarrosus," *scaly*, referring to the scaly involucre.

PART USED: The dried leaves and flowering tops.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Grindelia:* Stems and branches cylindrical, light yellow or rose colored, with alternate leaf scars, occasionally with basal portions of leaves, sometimes irregularly flexuous and coated with resin, and terminating in resinous flower heads; leaves usually separate from the stem and broken, oblong to oblong-spatulate, from 1 to 7 cm. in length, mostly sessile or amplexicaul and sharply serrate or evenly spinosely toothed, pale yellow to yellowish green, very resinous, somewhat coriaceous and brittle; bracts of flowering branches almost entire and usually more or less spreading; flower-heads from 5 to 20 mm. in diameter, urn-shaped and conical when unexpanded but flattened or depressed when partly open and usually very resinous; involucre bracts numerous, imbricated, with recurved tips; ray florets yellow or brownish, ligulate and pistillate; disk florets yellow, tubular and perfect; pappus of two or three mostly unequal linear awns about the length of the disk florets; disk achenes ovoid or oblong, compressed, four-angled or triquetrous, and either biauriculate or broadly unidentate or with a broad truncate, corky, thickened summit. Odor balsamic; taste aromatic and bitter, resinous.

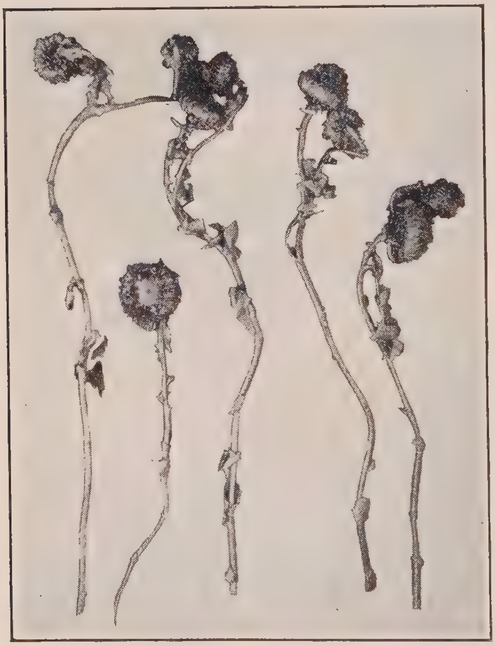


FIG. 103.—Grindelia robusta.

HABITAT: North America from Southern California to Minnesota, and British America from Manitoba to Saskatchewan.

DISCUSSION: Grindelia is a small perennial herb with a woody stem. The leaves and flowering tops become covered with a resinous exudation to which the medicinal properties are due.

CONSTITUENTS: Resin, about 20 per cent; volatile oil; grindeline (?).

PROPERTIES AND USES: Grindelia is in part excreted by the bronchial mucous membrane where it causes the muscular coat of the bronchial tubes to relax and increases their secretion. It is employed in whopping-cough, and in the later stages of asthma and bronchitis. It also finds service in chronic cystitis. The fluidextract is applied locally (1 in 10) in the dermatitis caused by poison sumac or ivy.

Dose: 30 gr. (2 Gm.).

Official Preparation: N.F. V.

Fluidextract of Grindelia, 30 m. (2 cc.).

PYRETHRUM

(pī-rē′thrŭm)

PYRETHRUM—U.S.P. IX

Synonyms: Pellitory Root; Spanish Pellitory; Spanish Chamomile.

Source: Anacyclus Pyrethrum (Linné) De Candolle (Fam. Compositæ).

Etymology: Anacyclus from the Gr. "a," *not*, "anthos," *flower*, and "kyklos," *a circle*, i.e., the outer circlet of ovaries is without florets.

Pyrethrum from the Gr. "pyr," *fire*, and "athros," *strong*, because certain portions of the plant have a burning taste.

Pellitory is a corrupted form of "*parietary*," from the Lat. "paries," *a wall*, so named because the plants often grow on old walls.

Part Used: The dried root.

Description and Physical Properties: Nearly cylindrical, slightly tapering, usually in pieces from 2.5 to 10 cm. in length and from 5 to 20 mm. in diameter; externally dark brown, deeply longitudinally furrowed and somewhat wrinkled, occasionally bearing short, tough, hair-like rootlets, crown more or less annulate, and occasionally tufted with coarse fibers or with long, soft-woolly, nearly straight, 1-celled hairs; fracture short; bark dark brown with 1 or 2 circular rows of resin ducts, closely adhering to the light-yellow, radiate, porous wood, in the medullary rays of which occur 1 to 3 rows of resin ducts; odor distinct; taste sweetish, pungent, very acrid, tingling and producing a strong sialogogue effect.

Habitat: The Levant, Barbary and the Mediterranean coast of Europe.

Discussion: Pyrethrum is a perennial, herbaceous plant with several stems, usually trailing at the base, but erect at the outer portion. These stems are from 8 to 12 inches in height and terminate in a large solitary flower. The florets of the disk are yellow, the rays white on their upper surface and reddish or purple beneath.

Constituents: Pyrethrine; volatile oil; resin; inulin, 50 per cent.

Properties and Uses: Very little pyrethrum is used in medicine. When masticated it causes a prickling sensation of the tongue and throat and acts as a sialagogue and irritant. It has been given for paralysis of the tongue or throat, relaxed uvula and toothache. The tincture may be applied to aching, carious teeth. The flowers are largely employed in the form of a powder as an insecticide as may be inferred from the fact that 6,435,405 pounds were imported in 1925.

Dose: 30 gr. (2 Gm.)

ANTHEMIS

(ăn′thē-mĭs)

ANTHEMIS—U.S.P. VIII

Synonyms: Roman Chamomile; Garden Chamomile; Whig Plant.

Source: Anthemis nobilis Linné (Fam. Compositæ).

Etymology: Anthemis from the Gr. "anthos," *flower*, referring to its numerous flower heads.

Nobilis, the Lat. for *noble*, because of the handsome yellow flowers.

Chamomile from the Gr. "chamai," *on the ground*, and "melon," *apple*, signifying *earth apple*. The buds are round, resembling tiny apples and lie on or near the ground.

Part Used: The dried flower-heads collected from cultivated plants.

Description and Physical Properties: Subglobular, 1.5 to 2 cm. broad, consisting of an imbricated involucre and numerous white, strap-shaped, obscurely three-toothed ray florets, and usually a few tubular disk florets, inserted upon a chaffy, conical, solid receptacle; odor agreeable; taste strongly aromatic and bitter.

Habitat: Southern and Western Europe. Cultivated in the United States.

Discussion: Anthemis is a perennial, herbaceous plant with trailing stems from 8 to 12 inches in length. The stems turn upward at the outer ends and are divided into numerous branches, each terminating in a solitary flower with a yellow convex disk and white rays.

Constituents: Volatile oil, blue when fresh, 1 per cent; resin; tannin; bitter principle; anthemic acid.

Properties and Uses: The volatile oil of anthemis is stimulant and antispasmodic. The bitter principle and anthemic acid are tonic. The drug is used for these properties in dyspepsia, general debility and weak digestion. Warm infusions of the drug in large doses are emetic, but cold infusions are tonic. The drug is sometimes used as a poultice for sprains, bruises and rheumatism.

Dose: 30 gr. (2 Gm.).

MATRICARIA

(măt′rĭ-kā′rĭ-ȧ)

MATRICARIA—N.F.

Synonyms: German Chamomile; Wild Chamomile; Horse Gowan.

Source: Matricaria Chamomilla Linné (Fam. Compositæ).

Etymology: Matricaria from the Lat. "matrix," *womb*, from "mater," *mother*, because the drug was supposed to have a specific action on the uterus.

Chamomilla from the Gr. "chamai," *on the ground*, and "melon," *apple*, signifying *earth apple*. The term was first used in connection with anthemis.

Horse gowan. This term is equivalent to *horse daisy* and comes from "gowan," the Scotch for *daisy*, from the Gaelic "gugan," *a bud* or *flower*.

Part Used: The dried flower-heads.

Description and Physical Properties: *Unground Matricaria:* Flower-heads composed of a few white ray-florets and numerous yellow disk-florets on conical, hollow receptacles, the latter being from 3 to 10 mm. in breadth; disk-florets tubular, perfect and without a pappus; ray-florets from 10 to 20, pistillate, corolla white, 3-toothed and 4-veined, usually reflexed; involucre hemispherical, composed of from 20 to 30 imbricated, oblanceolate and pubescent scales; peduncles light green to brownish green, longitudinally furrowed, more or less twisted and attaining a length of 2.5 cm.; achenes somewhat obovoid and faintly 3- to 5-ribbed; pappus none, or only a slight membranous crown. Odor pleasant, aromatic; taste aromatic and bitter.

Habitat: Europe, Western Asia. Cultivated in the United States.

Discussion: Matricaria is an annual, growing from 1 to 2 feet in height. It has a branching stem, each branch terminating in a capitulum which is very similar in appearance to our common mayweed.

Constituents: Volatile oil, blue when fresh, but turning green or brown in time, 0.25 per cent; tannin; anthemic acid.

Properties and Uses: Matricaria, administered in the form of a hot infusion, acts as a carminative, tonic and gastric stimulant. It is thus employed in convalesence and general debility. Its action and use is practically the same as that of anthemis.

Dose: 4 dr. (15 Gm.).

Official Preparation: N.F. V.

Emollient Species.

(*a*) SANTONICA

(săn-tŏn′ĭ-kȧ)

SANTONICA—U.S.P. VIII

(*b*) SANTONINUM

(săn-tō-nī′nŭm)

SANTONIN—U.S.P.

Synonyms: (*a*) Levant Wormseed; Alexandria Wormseed; European Wormseed; Turkestan Wormseed; Aleppo Wormseed.

Source: (*a*) Artemisia pauciflora (Ledebour) Weber (Fam. Compositæ).

Etymology: Santonica from the Lat. "santonicus," an adjective form from "Santoni," the name of a tribe inhabiting Southern Gaul (Aquitania).

Artemisia from the Gr. "Artemis," a goddess corresponding to the Roman goddess, Diana, to whom Artemisia absinthium was dedicated because of its supposed property of hastening puberty.

Pauciflora from the Lat. "paucus," *few*, and "flora," *flowers*, referring to the fact that it has but few blooms, mostly only buds.

Part Used: (*a*) The dried, unexpanded flower-heads.

(*b*) Santonin is the inner anhydride ($C_{15}H_{18}O_3$) of santoninic acid.

Description and Physical Properties: (*a*) Heads 2 to 4 mm. long, oblong-ovoid, slightly flattened, obtuse, consisting of an involucre of about 12 to 18 closely imbricated, glandular scales with broad midribs, enclosing 4 or 5 rudimentary florets. Santonica has the appearance of a granular, yellowish-green or greenish-brown, somewhat glossy powder; odor strong, peculiar, somewhat camphoraceous; taste aromatic and bitter.

(*b*) Colorless, shining, flattened rhombic prisms or a white, crystalline powder. It is odorless, and nearly tasteless at first, but afterwards develops a bitter taste. It is stable in the air, but rapidly becomes yellow on exposure to light.

Santonin is almost insoluble in cold water, and only slightly soluble in boiling water. One Gm. of Santonin is soluble in 43 cc. of alcohol, 1.7 cc. of chloroform, and in 110 cc. of ether, at 25° C. One Gm. is soluble in 6.5 cc. of boiling alcohol.

Habitat: Levant, Persia, Turkestan, Russia.

Discussion: Santonica is a small, semi-shrubby, perennial with many leafy stems, each bearing a flower-head. Most of the wormseed of commerce grows on the steppes of Northern Turkestan and is sent into Europe by way of Moscow. The export of santonica from this region is said at one time to have reached 1600 tons annually, but has declined in more recent years because of the erection at Orenburg and Tschimkent of factories for the extraction and preparation of santonin. It is estimated that about 25 tons of santonin are used in medicine each year. About one-half of this is produced in the factories mentioned above. It is claimed that the percentage of santoninic acid in the plant reaches its maximum of 2½ to 3½ per cent during July and August and that it rapidly decreases after flowering. In 1924, 1418 pounds of santonin and its salts were imported.

CONSTITUENTS: (*a*) Of Santonica: Santonin, 2 to 3 per cent; volatile oil; resin; artemisin.

PROPERTIES AND USES: This drug has long been used against intestinal worms. It was introduced into Europe by the Crusaders, who found it in use by the peoples of Western Asia. Santonin is the remedy, *par excellence,* for the roundworm (Ascaris lumbricoides). Since the roundworm inhabits the small intestine, and is killed by the drug, a sharp cathartic acting on that part of the bowel should be administered two to four hours following the drug in order to remove the worms. Santonin should not be administered to children while constipated.

DOSE: (*a*) Santonica: 15 to 60 gr. (1 to 4 Gm.)
(*b*) Santonin: 1 gr. (0.06 Gm.).

ARNICA

(är′nĭ-kȧ)

ARNICA—N.F.

SYNONYMS: Leopard's-bane; Wolf's-bane; Mountain Tobacco.

SOURCE: Arnica montana Linné (Fam. Compositæ).

ETYMOLOGY: Arnica from the Gr. "arnakis," *a sheepskin,* referring to the woolly appearance of the stems and leaves.

Montana from the Lat. "montanus," *mountainous,* from "mons, montis," *a mountain,* i.e., it grows in mountainous regions.

PART USED: The dried flower-heads.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Arnica:* Consisting chiefly of the tubular and ligulate flowers, usually with the involucre and receptacle present; involucral bracts narrowly lanceolate, about 1 cm. long, dark green and pubescent, receptacle slightly convex, deeply pitted and densely short-hairy; ray flowers yellow; the ligulate portion up to 2 cm. long more or less folded lengthwise, 3-toothed, 7- to 12-veined, pistillate; tubular flowers perfect, reddish-yellow, stamens without a tail-like appendage; the achenes spindle-shaped, 5 to 7 mm. long, dark brown, finely striate; glandular-pubescent and surmounted by a pappus a little longer than the achene and composed of a single circle of nearly white barbellate bristles. Odor characteristic and agreeable; taste bitter and acrid.

Habitat: Europe (Germany and Switzerland in the Alps and Pyrenees) Asia, North America.

Discussion: Arnica is a perennial, herbaceous plant with a woolly stem growing about 10 or 12 inches in height and terminating in two or three peduncles, each bearing a yellow flower (capitulum). In 1924, 28,141 pounds of arnica were imported.

Constituents: Volatile oil; resin; arnicin.

Properties and Uses: Arnica popularly is thought to possess a large variety of medicinal properties and an equal number of therapeutic uses. It is rather poisonous and is seldom used internally. Its therapeutic employment in this country is limited to the application of the tincture, or similar alcoholic preparations, to sprains, bruises, etc., for the relief of stiffness or soreness of muscles, joints or tendons. It is quite possible that the alcohol in the tincture, together with the massage in applying it, accomplishes whatever good results from its use.

Dose: 1½ gr. (0.1 Gm.).

Official Preparations: N.F. V.

Fluidextract of Arnica, 1½ m. (0.1 cc.).
Tincture of Arnica, 15 m. (1 cc.).

CALENDULA

(kȧ-lĕn′dṻ-lȧ)

CALENDULA—N.F.

Synonyms: Marigold; Garden Marigold; Mary-bud; Gold-bloom.

Source: Calendula officinalis Linné (Fam. Compositæ).

Etymology: Calendula from the Lat. "calendæ," *the first day of the month*, because the flowers bloom nearly every month of the year.

Officinalis from the Lat. "officina," *a work-shop* or *store*, from "opus," *work*, and "facere," *to do*, referring to the fact that it was kept for sale in the shops.

Part Used: The dried ligulate florets.

Description and Physical Properties: *Unground Calendula:* Florets from 15 to 25 mm. long, yellow or orange colored, 1- to 3-toothed, 4- to 5-veined, margin nearly entire, the short hairy tube occasionally enclosing the remnant of a filiform style and bifid stigma. Odor slight, somewhat heavy; taste slightly bitter, faintly saline.

Habitat: Southern Europe and the Levant. Widely cultivated as an ornamental plant.

Discussion: This is the common garden marigold and is too well known to require description here. The florets have a slightly narcotic odor and a bitter, somewhat saline, taste. The drug is sometimes colored with a red dye and used to adulterate Spanish saffron. The deception can be detected by the aid of the microscope, however, since the stigma of the crocus is 3-limbed while the strap-shaped corolla of calendula is simple with a 3-toothed apex.

Constituents: Volatile oil; calendulin; bitter principle.

Properties and Uses: Calendula is quite an important drug in the Homeopathic materia medica, which directs that the fresh leaves at the top of the plant, together with the blossoms and buds, be chopped and pounded to a pulp, enclosed in a piece of new linen and subjected to pressure, and that the juice, thus expressed, be mixed with an equal weight of alcohol. This mixture is allowed to stand eight days in a well-stoppered bottle, in a dark, cool place and then filtered. In the regular medical practice, its use is similar to that of arnica, i.e., as an embrocation in sprains, bruises, stiff or sore muscles, etc.

Dose: 15 gr. (1 Gm.).

Official Preparations: N.F. V.

Fluidextract of Calendula, 15 m. (1 cc.).
Tincture of Calendula.

TARAXACUM

(tá-răk′sȧ-kŭm)

TARAXACUM—N.F.

Synonyms: Dandelion; Blowball; Milk Gowan; Witch Gowan; Yellow Gowan; Lion's-tooth; Cankerwort; White Endive; Irish Daisy; Priest's-crown.

Source: Leontodon Taraxacum Linné (Fam. Compositæ).

Etymology: Taraxacum from the Gr. "tarasso, taraktikos," *to move* or *disturb*, referring to its action on the bowels.

Officinale from the Lat. "officina," *a work-shop* or *store*, from "opus," *work*, and "facere," *to do*, referring to the fact that it was kept for sale in the stores or shops.

Gowan is the Scotch for *daisy*, from the Gaelic "gugan," *a bud* or *flower*.

Part Used: The dried rhizome and roots.

Description and Physical Properties: Unground Taraxacum: Cylindrical or somewhat flattened, gradually tapering, usually in broken pieces, from 6 to 15 cm. in length, and from 5 to 15 mm. in thickness; externally brown or blackish brown, longitudinally wrinkled, having numerous root and rootlet scars; crown simple or branched with numerous leaf bases showing annulate markings; fracture horny, short, non-fibrous. Odor slight or inodorous; taste bitter.

HABITAT: Europe. Naturalized in North America.

DISCUSSION: The common dandelion is an herbaceous, perennial now found in many parts of the world. The flower stem rises from 6 to 12 or more inches in height and is terminated by a large golden-yellow flower. The leaves are long and narrow and spring immediately from the root. The pappus is stipulate and at maturity is disposed in a spherical form and is so light and feathery as to be easily carried by the wind, thus distributing the seeds over large areas. All parts of the plant are pervaded by a bitter milky juice which exudes whenever the plant is injured. The leaves are much used in salads and greens.

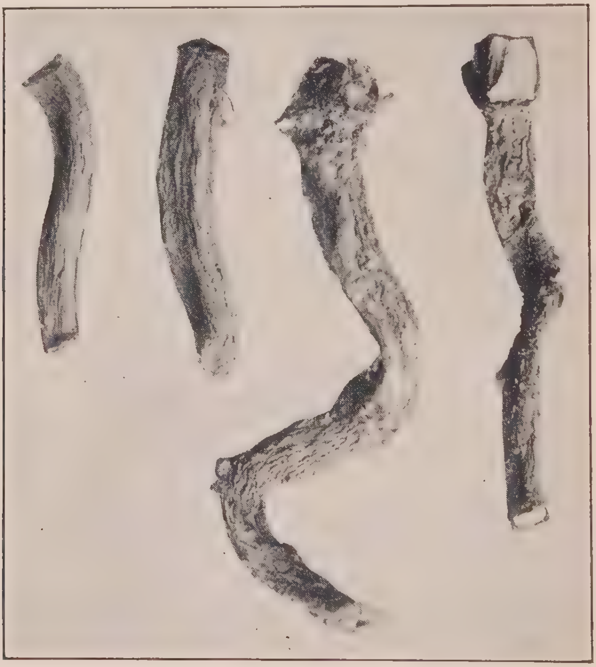


FIG. 104.—Taraxacum. $\frac{2}{3}$ size.

CONSTITUENTS: Taraxacin and taraxacerin which may not be definite chemical entities; resins: inulin, 24 per cent; pectin, 5 to 10 per cent.

PROPERTIES AND USES: Taraxacum is a stomachic tonic and deobstruent. It has been employed to relieve congestion of the liver but has led to disappointment in many cases. Some medical authorities claim that the fresh rather than the dried root should be used. Many people dry the root, and either bruise or grind it to a coarse powder to be used in the form of a decoction as a substitute for coffee. As such it exerts a slight aperient effect.

Dose: $2\frac{1}{2}$ dr. (10 Gm.).

Official Preparations: N.F. V.

Aromatic Elixir of Eriodictyon, 1 fl. dr. (4 cc.).
Glycerinated Elixir of Gentian, 2 fl. dr. (8 cc.).
Elixir of Guarana, 1 fl. dr. (4 cc.).
Compound Elixir of Taraxacum, 2 fl. dr. (8 cc.).
Extract of Taraxacum, 15 gr. (1 Gm.).
Fluidextract of Taraxacum, $2\frac{1}{2}$ fl. dr. (10 cc.).

LACTUCARIUM

lăk′tŭ̇-kā′rĭ-ŭm)

LACTUCARIUM—U.S.P. IX

Synonyms: Lettuce Opium; Acrid Lettuce; Wild Lettuce; Prickly Lettuce; Strong-scented Lettuce; Green Endive.

Source: Lactuca virosa Linné (Fam. Compositæ).

Etymology: Lactucarium from the Lat. "lactuca," *lettuce*, from its resemblance to the common garden lettuce, from "lac, lactis," *milk*, because of the milky appearance of the juice.

Virosa from the Lat. "virosus," *poisonous*, referring to its narcotic action.

Part Used: The dried milk-juice.

Description and Physical Properties: Usually in quarter sections of hemispherical masses, or in irregular, angular pieces; externally dull reddish or grayish brown; fracture tough, waxy; internally light brown or yellowish, somewhat porous; odor distinctive, opium-like; taste bitter.

Habitat: Central and Southern Europe, Western Siberia. Naturalized in New England. Cultivated in Germany, France, Austria and Scotland.

Discussion: Lactucarium is a biennial plant with an erect branching stem growing from 2 to 4 feet in height, each branch terminating in a panicle of sulphur-yellow flowers. It has a strong disagreeable odor, not unlike that of opium. There are three commercial varieties of lactucarium:

(1) *English Lactucarium:* Collected in England and Scotland in August and September by cutting the flower-heads and scraping the exuding juice into containers. This process is repeated several times a day for a period of several weeks, a fresh slice of the stalk being removed

each time. The juice thus collected thickens and is dried at a gentle heat until it loses 75 per cent of its weight.

(2) *German Lactucarium:* This is prepared chiefly in the vicinity of Zell, a small town on the Moselle River. Collection is made from May till September in much the same way as in England. This variety comes in irregular lumps or masses.

(3) *French Lactucarium:* This is collected in glass vessels from transverse incisions made in the stem. When concreted, it is formed into circular cakes and dried on sieves.

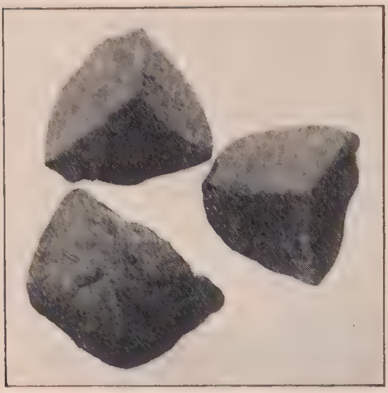


Fig. 105.—Lactucarium.

Constituents: Lactucerin or lactucon ($C_{23}H_{36}O_2$); lactucin ($C_{11}H_{12}O_3$); lactucic acid; lactucopicrin; mannite, 2 per cent; oxalic acid, 1 per cent.

Properties and Uses: Lactucarium is reputed to be sedative, anodyne and hypnotic and is used to allay cough and induce sleep where sleeplessness is caused by continuous hacking or irritating cough. It is used in many cases in which opium would be objectionable.

Dose: 15 gr. (1 Gm.).

FARFARA

(fär-fär′ä)

COLTSFOOT—N.F.

Synonyms: Tussilago Leaves; Coughwort.
Source: Tussilago Farfara Linné (Fam. Compositæ).
Etymology: Tussilago from the Lat. "tussis," *a cough*, and "agere," *to drive away*, i.e., cures or relieves cough.
Part Used: The dried leaf.

Description and Physical Properties: *Unground Coltsfoot:* Petiole long, pubescent; blade very brittle, nearly orbicular or broadly ovate-reniform, from 8 to 15 cm. long and nearly as wide, deeply cordate at the base, angular and dentate with red-brown teeth, palmately 5- to 9-nerved; glabrous above, slightly wrinkled, dark green to brownish green or yellowish green. The younger leaves densely white, floccose beneath, the older nearly or often quite glabrous below. Odor indistinct; taste mucilaginous, faintly herbaceous, bitter.

Habitat: Europe, Canada, United States.

Discussion: This is a low, perennial, herbaceous plant growing in moist places and spreading by means of long, fleshy rhizomes. The leaves are radical and stand on long petioles. They are smooth on their upper surface, pubescent beneath, and do not appear until after the flowering of the plant. They are roundish, heart-shaped and vary from 3 to 6 inches in diameter. The flower-heads are yellow, smaller than those of the dandelion and appear very early in the spring.

Constituents: Bitter glucoside; resin; volatile oil.

Properties and Uses: Coltsfoot is demulcent, and because of this property is widely employed in the treatment of coughs and bronchitis. It is a popular domestic remedy and is commonly administered in the form of a decoction.

Dose: 60 gr. (4 Gm.).

Official Preparation: N.F. V.

Pectoral Species, 1 dr. (4 Gm.).

INULA

(ĭn′ū-lȧ)

INULA—N.F.

Synonyms: Elecampane; Elf-dock; Valet Dock.

Source: Inula Helenium Linné (Fam. Compositæ).

Etymology: Inula, the Lat. for *elecampane*.

Elecampane from the Lat. "campana," *a bell*, referring to the shape of the flower buds.

Helenium from the Gr. "Hellenes," *the Greeks*, i.e., of or pertaining to Greece.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Inula:* Rhizome usually split into longitudinal or more or less oblique pieces to which may be attached one or more of the roots; up to 8 cm. long and 4 cm. in diameter; externally grayish brown to dark brown, longitudinally wrinkled with occasional buds or stem scars and surmounted at the crown by a portion of the overground stem; inner or cut surface somewhat concave, the edges incurved with the overlapping bark, yellowish brown to grayish brown, longitudinally striate and more or less fibrous near the cambium zone; fracture short and horny; internally light brown and marked by numerous circular or elliptical oleoresin canals; roots cylindrical and tapering, frequently curved or irregularly curled, up to 13 cm. in length and 1.5 cm. in diameter. Odor aromatic; taste acrid, bitter and pungent.

Habitat: Central and Southern Europe, Asia. Naturalized in the eastern portion of the United States and Canada.

Discussion: Elecampane is a coarse, perennial, herbaceous plant growing from 3 to 6 feet in height. In this country it is found mostly in pasture fields or growing in moist, stony places. The lower leaves spring from the root in the form of a rosette. Those of the stem are somewhat smaller. Each leaf is from 12 to 18 inches in length and from 4 to 8 in breadth. They are ovate in shape and the under surface is covered with soft, velvety leaf-hairs. The large yellow flowers are arranged in the form of a loose terminal corymb. The rhizome and roots should be collected at the close of the growing season the second year of their growth, or the following spring before vegetation has started. They occur in the market in the form of transverse slices or longitudinal sections. They have a peculiar aromatic odor and a bitter taste.

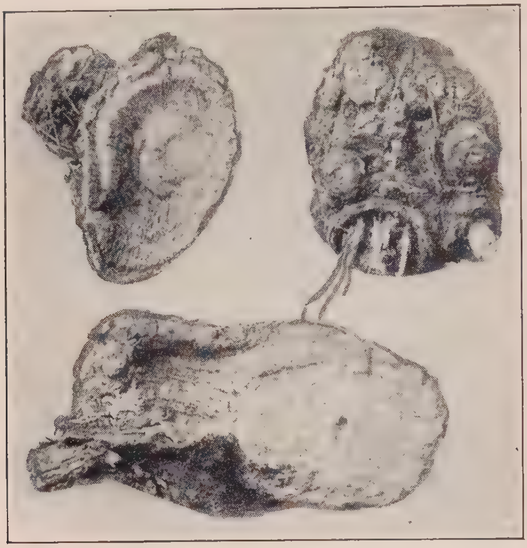


Fig. 106.—Inula.

Constituents: Inulin, up to 45 per cent; volatile oil; resin; bitter principle.

Properties and Uses: Elecampane is a mild tonic and stimulant, but does not appear to possess any definite medicinal value.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Antiperiodic Pills, 1 pill.
Antiperiodic Pills without Aloe, 1 pill.
Antiperiodic Tincture, 1 fl. dr. (4 cc.).
Antiperiodic Tincture without Aloe, 1 fl. dr. (4 cc.).

LAPPA

(lăp′ă)

LAPPA—N.F.

Synonyms: Burdock Root; Beggars' Buttons; Cuckoo Button; Hare-burr.

Source: Arctium Lappa Linné or Arctium minus Bernhardi (Fam. Compositæ).

Etymology: Lappa from the Lat. "lappa," *a bur*, referring to the characteristic flower-heads.

Arctium from the Gr. "arktos," *a bear*, referring to the claw-like bracts of the involucre of the burs which cause them to attach themselves to the coats of animals, or other passing objects for the purpose of scattering their seeds.

Minus, the Lat. for *less* or *smaller*, i.e., a smaller species.

Part Used: The dried, first year root.

Description and Physical Properties: *Unground Lappa:* Nearly simple, fusiform, of variable length, from 5 to 20 mm. in diameter near the crown, frequently split or in broken pieces; externally grayish brown, longitudinally wrinkled, the crown somewhat annulate, sometimes surmounted by a woolly tuft of leaf remains; fracture somewhat horny; a dark cambium separating the thick brownish bark from the yellowish porous and radiate wood, centrally hollow or containing a white, pith-like tissue. Odor slight, becoming pyroligneous on milling; taste mucilaginous, sweetish and slightly bitter.

Habitat: Europe, Northern Asia. Naturalized in North America.

Discussion: Burdock is a very coarse, biennial herb growing from

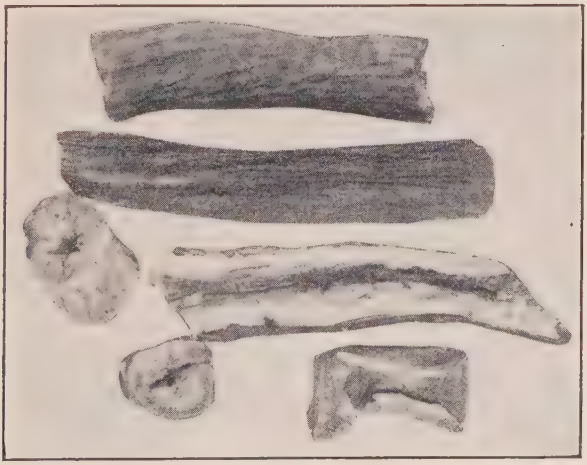


Fig. 107.—Lappa.

2 to 4 or more feet in height. It is found in rich soil along fence-rows and about farm buildings throughout most parts of the United States and Canada where it has become a very troublesome weed. The stems, which arise the second year, are coarse and angular, giving rise to numerous leaves and terminating in large racemose-paniculate flower clusters commonly called "*burrs*." These are globoid in shape and vary from ½ to 1 inch in diameter. By means of the recurved, hook-like tips of the bracts of the involucre, they cling tenaciously to passing objects, thus distributing their seeds. The root is fusiform in shape and may reach 10 to 20 inches in length in good soil. As seen in the market it is usually broken into pieces or sliced longitudinally. It has a slight, but distinct, odor and a mucilaginous taste.

CONSTITUENTS: A bitter glucoside called "lappin"; inulin, 45 per cent; mucilage; gum; oil.

PROPERTIES AND USES: Burdock root is alterative and diuretic and is employed in the treatment of rheumatic, gouty and scrofulous conditions, also in certain skin diseases as in acne and psoriasis.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Lappa, 30 m. (2 cc.).

SENECIO

(sė̄-nē′shĭ-ō)

SENECIO—N.F.

SYNONYMS: Life Root; Squaw-weed; Ragwort; False Valerian.

SOURCE: Senecio aureus Linné (Fam. Compositæ).

ETYMOLOGY: Senecio from the Lat. "senex," *an old man*, alluding to the white hairs of the pappus.

Aureus, the Lat. for *golden*, from "aurum," *gold*, referring to the color of the flowers.

PART USED: The dried plant.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Senecio:* Stems from 3 to 6 dm. in length, if entire bearing a basal rosette of leaves; sparingly clothed with successively smaller leaves and bearing at the summit several yellow heads in a loose corymb, white floccose when young, but mostly glabrous when expanded, radical leaves on long, slender petioles, mostly of rounded form from 5 to 7 cm. in breadth, the base often cordate, the summit rounded, the margin crenate-dentate; stem-leaves gradually changing from the shape of the radical leaves to lyrately pinnate, then pinnatifid and sessile, and at length clasping, oblong and incised; heads slender peduncled from 12 to 25 mm. in width, the lance-linear involucral scales in about two series, closely appressed, rays about ten, bright yellow, disk flowers very numerous, small, bearing a glabrous achene and a white pappus.

Odor characteristically aromatic; taste bitter, slightly astringent and distinctly acrid and pungent.

Habitat: Eastern North America.

Discussion: This is a perennial, herbaceous plant blooming in early spring and growing from 1 to 2 feet in height. It frequents swamp and meadowlands throughout the Northern and Central States. The stem is smooth and slender and somewhat fluted. The root-leaves are oblong and petiolate and somewhat larger than those proceeding from the stem. The flower-heads occur on slender peduncles and are disposed in loose corymbs. Each flower-head has from eight to twelve golden-yellow rays while the disk is of a brownish-yellow color. The ray-flowers are pistillate while the disk-flowers bear both stamens and pistils. This drug was much used by the Indians inhabiting this region who called it "*Mequot.*"

Constituents: Senecio is bitter and astringent, but little is known as to its actual constituents.

Properties and Uses: Senecio is employed by Eclectic physicians as a stimulant and emmenagogue. As an emmenagogue, it has been claimed, somewhat extravagantly, perhaps, to regulate the menstrual function whether absent or too profuse.

Dose: 1 dr. (4 Gm.).

Official Preparation: N.F. V.

Fluidextract of Senecio, 1 fl. dr. (4 cc.).

ECHINACEA

(ĕk′ĭ-nā′shi-ȧ)

ECHINACEA—N.F.

Synonym: Brauneria.

Source: Brauneria pallida (Nuttall) Britton or Brauneria angustifolia (De Candolle) Heller (Fam. Compositæ).

Etymology: Echinacea from the Lat. "echinus," *hedgehog*, referring to its sharp spines.

Brauneria, named for J. Brauner, a German botanist.

Pallida from the Lat. "pallidus," *pale*, referring to the color of the bark.

Angustifolia from the Lat. "angustus," *narrow*, and "folium," *leaf*, i.e., narrow-leafed.

Part Used: The dried rhizome and roots.

Description and Physical Properties: *Unground Echinacea:* Nearly entire, cylindrical, very slightly tapering and sometimes spirally twisted, from 10 to 20 cm.

long and from 4 to 15 mm. in diameter; externally grayish brown, light brown or purplish brown; slightly annulate in the upper portion, with occasional stem scars somewhat longitudinally wrinkled, or furrowed; fracture short, fibrous; bark less than 1 mm. thick, wood composed of alternate light yellowish and black wedges; the rhizome with a circular or angular pith. Odor faint, aromatic; taste sweetish, followed by a tingling sensation suggesting aconite, but lacking the persistent and benumbing effect produced by that drug.

HABITAT: Central and Southern United States.

DISCUSSION: Brauneria pallida is a tall, coarse, perennial, herbaceous plant. It has a simple stem and alternate, 3- to 5-veined leaves. The drug is collected for the most part in Kansas. The rhizome appears in the market in the form of pieces from 4 to 8 inches in length. They are brown in color and show V-shaped stem-scars. They have an aromatic odor and a sweetish taste, followed by a tingling sensation to the tongue and lips.

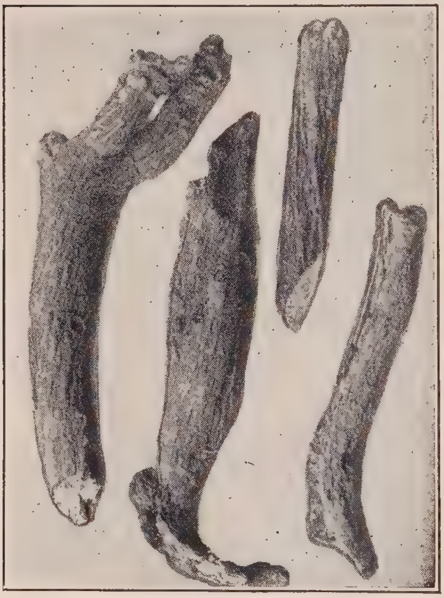


FIG. 108.—Echinacea.

CONSTITUENTS: Acrid resin, 1 per cent; alkaloid, a trace. The resin represents the activity of the drug.

PROPERTIES AND USES: Echinacea is alterative, diaphoretic and sialagogue. It is employed in eczema, chronic ulcers and hemorrhoids.

DOSE: 15 gr. (1 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Echinacea, 15 m. (1 cc.).

CHAPTER LXXX

ASCLEPIADACEÆ

(ăs-klē′pĭ-ȧ-dā′sḗ-ē)

MILKWEED FAMILY

This is a very large family, numbering about 225 genera and nearly 2000 species. They are herbs or shrubs with umbellate flowers, adapted to insect pollination, and are widely distributed.

ASCLEPIAS

(ăs-klē′pĭ-ăs)

ASCLEPIAS—N.F.

Synonyms: Pleurisy Root; Butterfly Weed; Orange Swallow-wort; Yellow Milk-weed.

Source: Asclepias tuberosa Linné (Fam. Asclepiadaceæ).

Etymology: Asclepias from the Gr. "asklepias," named for Æsculapius, the god of medicine.

Tuberosa from the Lat. "tuberosus," *possessed of tubers.*

Part Used: The dried root.

Description and Physical Properties: *Unground Asclepias:* Irregularly fusiform; when entire 10 to 20 cm. long, 0.5 to 5 cm. thick, occasionally branched, usually cut or in broken pieces of variable size; externally pale orange brown, or grayish brown; annulate above, the surface roughened by numerous fine intersecting grooves; bark thin; fracture tough, the broken surface granular and white, with pale yellow wood bundles and white medullary rays. Odor slight; taste bitterish and disagreeable, somewhat acrid.

Habitat: United States, Canada.

Discussion: This is a perennial plant growing from 2 to 3 feet in height, common in sandy soil throughout North America, except in the far Western States. The stems are hairy and vary in color from green to almost red. The flowers are a beautiful orange yellow and occur in large clusters at the ends of the stems. Unlike all other species of Asclepias, it possesses no milk-juice.

Constituents: Asclepiadin, a glucoside; volatile oil; resin; tannin.

Properties and Uses: Emetic, cathartic and, because of its nauseous properties, also diaphoretic and expectorant. Because of these properties, asclepias has been used in bronchitis and in the early stages of pleurisy and pneumonia especially by Eclectic physicians. Ordinarily it is employed in the form of a decoction, 2 to 3 fluid ounces being administered every two hours.

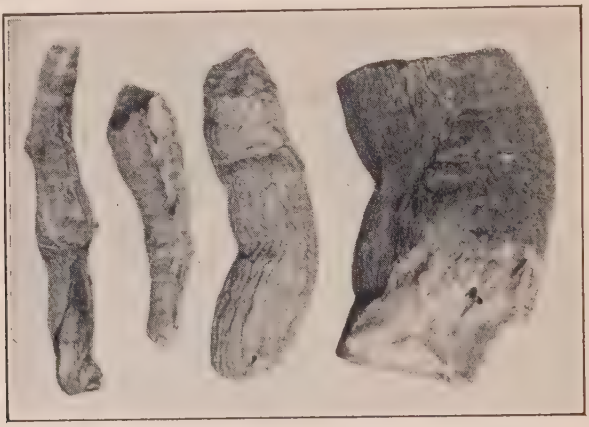


Fig. 109.—Asclepias.

Dose: 30 gr. (2 Gm.).

Official Preparation: N.F. V.

Fluidextract of Asclepias, 30 m. (2 cc.).

CONDURANGO

(kŏn′dŭ-răn′gō)

CONDURANGO—N.F.

Source: Marsdenia Cundurango (Triana) Nichols (Fam. Asclepiadaceæ).

Etymology: Condurango from the Peruvian "cundurango," its native name.

Marsdenia named in honor of W. Marsden, an English author.

Part Used: The dried bark.

Description and Physical Properties: *Unground Condurango:* In quills or transversely curved pieces, usually from 4 to 13.5 cm. long; bark 1 to 6 mm. thick; outer surface light grayish brown to dark brown, nearly smooth and with numerous lenticels, or more or less scaly and considerably roughened, occasionally with whitish lichens bearing brownish black apothecia; inner surface grayish white or light brown, longitudinally striate; fracture short-fibrous in the outer portion and granular in the inner portion. Odor slightly aromatic, especially marked in the fresh drug; taste bitter and aromatic.

HABITAT: Ecuador, Peru.

DISCUSSION: This is a prostrate or climbing vine found growing in the high mountainous districts of the afore-named countries. The drug occurs in quills or transversely curved pieces, usually about 4 inches in length. The outer surface varies from a light grayish brown to a dark brown in color. It is nearly smooth, but has numerous lenticels and frequently shows whitish lichens adhering. The interior surface is grayish white or light brown in color. There is present a slight aromatic odor and a bitter taste.

CONSTITUENTS: Condurangin, probably a mixture of several glucosides; tannin, 12 per cent; resin.

PROPERTIES AND USES: Condurango has long been regarded as a cure for cancer in certain districts of South America, but possesses no such therapeutic property. It is claimed to increase the circulation and the flow of urine; also to possess diaphoretic properties.

DOSE: 60 gr. (4 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Condurango, 1 fl. dr. (4 cc.).

CHAPTER LXXXI

JUGLANDACEÆ

(jo͞o′glăn-dā′sē̇-ē)

WALNUT FAMILY

This is an important family of valuable trees indigenous to both Europe and America. They have odd-pinnate leaves and ochlamydeous staminate flowers occurring in aments. The pistillate flowers are solitary or few and have a perianth. The nutlike fruit is a drupe with a fibrous or woody exocarp.

JUGLANS

(jo͞o′glănz)

JUGLANS—N.F.

Synonym: Butternut Bark.

Source: Juglans cinerea Linné (Fam. Juglandaceæ).

Etymology: Juglans, the Lat. for *walnut*.

Cinerea from the Lat. "cinereus," *ash-colored*, from "cinis," *ashes*, referring to the color of the bark.

Part Used: The dried inner bark of the roots.

Description and Physical Properties: *Unground Juglans:* In quills, curved strips, or in chips, from 3 to 10 mm. in thickness; of a deep-brown color on both surfaces and throughout, except for the faint, intersecting, whitish, radial and tangential lines shown in the transverse section; outer surface smooth, somewhat warty; inner surface smooth and striate, bearing fragments of thin stringy fibers; fracture short, rather weak, somewhat fibrous. Odor faintly aromatic; taste bitter, astringent, somewhat acrid.

Habitat: Eastern and Central United States.

Discussion: This is a medium-sized tree with wide-spreading top, formerly quite plentiful in the rich forest-lands of the Eastern and Central States. The bark is light gray in color and deeply fissured. The leaves are very long and pinnately divided. It is monœcious, the staminate flowers occurring in thick, green catkins from 3 to 4 inches long, while the pistillate flowers occur in small spikes of from three to five flowers each. These latter are followed in fruit by a cluster of as many ovoid pointed nuts of a delicious oily flavor.

Sometimes this bark is adulterated with bark from the trunk. If this be present, it can be detected by its gray, fissured appearance or by the patches of silver-gray lichen attached.

CONSTITUENTS: Fixed oil, 5 to 5.5 per cent; resin, 2 to 2.5 per cent; volatile oil; tannin; juglandic acid.

PROPERTIES AND USES: Butternut bark is a laxative and mild hepatic stimulant. It is used in chronic constipation, for which it is considered fairly efficacious.

DOSE: 1 dr. (4 Gm.).

OFFICIAL PREPARATIONS: N.F. V.

Fluidextract of Juglans, 1 fl. dr. (4 cc.).
Compound Elixir of Cascara Sagrada, 1 fl. dr. (4 cc.).

CHAPTER LXXXII

CACTACEÆ
(kăk-tā′sē̇-ē)

CACTUS FAMILY

This is a large family, numbering 20 genera and about 1000 species. They are found for the most part in arid or semi-arid regions. The members have fleshy stems and branches on which the foliage leaves are replaced by scales or sharp spines.

CACTUS GRANDIFLORUS
(kăk′tŭs grăn′dī-flōr′ŭs)

CACTUS GRANDIFLORUS—N.F.

Synonyms: Night-blooming Cereus; Vanilla Cactus; Sweet-scented Cactus.

Source: Selenicereus grandiflorus (Linné) Britton et Rose (Fam. Cactaceæ).

Etymology: Cactus from the Gr. "kaktos," *a prickly plant,* referring, of course, to their numerous spines.

Grandiflorus from the Lat. "grandis," *grand,* and "flos, floris," *flower,* referring to the size of the flowers.

Selenicereus from the Gr. "Selene," *the goddess of the moon,* from "selene," *the moon,* i.e., dedicated to Selene because it blooms at night.

Part Used: The fresh, succulent stems of the wild growing plants.

Description and Physical Properties: *Whole Cactus Grandiflorus:* In pieces of varying length, from 1.5 to 4 cm. in diameter, and from 5 to 9 angled; the angles at intervals of about 2 cm. with tufts of from 9 to 12 acicular spines about 5 mm. in length, together with about the same number of bristles about 1 cm. in length; at irregular intervals branched roots sometimes present. It has a strong, herby odor; taste acidulous and mucilaginous.

Habitat: West Indies; Mexico; Central America.

Discussion: This is the famous night-blooming cereus so remarkable for the beauty and fragrance of its flowers. The stem may be prostrate, or rise at an angle from the ground. It is grass-green in color and has from 5 to 7 angles. The large white flowers open at night, lasting but a few hours. They are remarkable for their size and fragrance, being from 6 to 12 inches in diameter. The drug consists of the fresh succulent stems and usually comes cut into short segments showing alternate clusters of from six to eight spines.

CONSTITUENTS: Very little is known regarding the chemistry of this drug. It is claimed to contain one or more resins.

PROPERTIES AND USES: This drug has been held in high esteem in tropical America as a diuretic and heart remedy and has been employed in much the same class of disorders as digitalis, but much doubt exists at the present time as to its efficacy.

DOSE: 8 gr. (0.5 Gm.).

OFFICIAL PREPARATION: N.F. V.

Tincture of Cactus Grandiflorus, 15 m. (1 cc.).

CHAPTER LXXXIII

MYRICACEÆ

(mĭr′ĭ-kā′sē̇-ē)

BAYBERRY FAMILY

This family, although known as the "Bayberry Family," is not related to the true bayberry. It consists of but 2 genera. Its members are shrubs, bearing alternate, mostly coriaceous leaves with small, declinous flowers borne in aments at the axils of the bracts. The fruit is a small nut or drupe.

MYRICA

(mĭ-rī′kȧ)

BAYBERRY BARK—N.F.

Synonyms: Wax-myrtle; Candle-berry; Wax-berry; Tallow Shrub; Tallow Bayberry.

Source: Myrica cerifera Linné, or Myrica carolinensis Miller (Fam. Myricaceæ).

Etymology: Myrica from the Gr. "myrios," *numberless*, from "myrias," *a myriad.*

Cerifera from the Lat. "cera," *wax*, and "ferre," *bearing*, i.e., wax-bearing, referring to the wax covering the fruits.

Part Used: The dried bark of the root.

Description and Physical Properties: *Unground Bayberry Bark:* In transversely curved pieces, strips or quills of varying length and breadth and usually 2.5 mm. or less in thickness, rarely up to 5 mm. in thickness (aerial stem bark); outer surface varying from silvery gray to grayish brown or reddish brown, scaly in rhizome and root barks, bearing occasional warts or slight transverse ridges, that of the aerial stem bark exhibiting a number of raised oval lenticels; inner surface reddish brown to brown, finely longitudinally striated, somewhat roughened (rhizome and root barks); fracture short, weak and uneven, the fractured surface reddish brown with short, projecting fibers near and along the inner margin of root bark. Odor characteristic; taste astringent, mildly bitter and slightly acrid.

Habitat: Eastern coast of United States.

Discussion: Bayberry is a dense, diœcious, evergreen shrub or tree growing from 4 to 35 feet in height. It borders the seacoast from Maine to Florida and westward to Texas. The fruit is a globular 1-seeded nut thickly coated with a bluish-white wax. The leaves bear resin-dots and are highly aromatic. The drug is collected in the fall.

CONSTITUENTS: Volatile oil; resin; myricinic acid; tannin.

PROPERTIES AND USES: Bayberry is stimulant, tonic and astringent. Large doses produce emesis. Externally it is astringent.

DOSE: 8 gr. (0.5 Gm.).

OFFICIAL PREPARATION: N.F. V.

Compound Powder of Bayberry, 15 gr. (1 Gm.).

CHAPTER LXXXIV

DROSERACEÆ

(drŏs′ẽr-ā′sē̇-ē)

SUNDEW FAMILY

This is a small family of herbs, numbering 6 genera and about 125 species. They are insectivorous and widely distributed.

DROSERA

(drŏs′ẽr-ȧ)

DROSERA—N.F.

Synonyms: Sundew; Moorgrass; Youthwort.

Source: Drosera rotundifolia Linné, frequently mixed with the closely allied species Drosera anglica Hudson and Drosera longifolia Linné, or at times wholly replaced by them (Fam. Droseraceæ).

Etymology: Drosera from the Gr. "droseros," *dewy*, referring to the striking beauty of the plant when covered with dew and glittering in the sunshine.

Rotundifolia from the Lat. "rotundus," *round*, and "folium," *leaf*, referring to the shape of the leaves.

Anglica from the Lat. "Anglicus," *English*.

Longifolia from the Lat. "longus," *long*, and "folium," *leaf*, i.e., long-leaved.

Part Used: The air-dried flowering plant.

Description and Physical Properties: *Unground Drosera:* Matted or broken leaves, stems and fibrous black rootlets; of a reddish color throughout; leaves mostly basal, petiolate. *Drosera rotundifolia:* blade orbicular, about 15 mm. in diameter, abruptly contracted into a slender, pubescent petiole, upper surface covered with prominent pinkish red glandular tentacles, the latter up to 4 mm. in length; petiole slender, 2 to 4 cm. in length, 0.5 to 2 mm. in diameter, flattened and pubescent; scape filiform, smooth, from 10 to 30 cm. long, bearing a few five-parted, small, white fugacious flowers in a curved one-sided raceme. *Drosera anglica:* leaves linear to obovate spatulate with blades 1.5 to 5 cm. long, 3 to 7 mm. wide, and glabrous or sparsely hairy petioles. *Drosera longifolia:* leaves spatulate with blades 2 to 3 times as long as they are wide, slender smooth petioles and scape, declinate at base. Odorless; taste faintly bitter and acidulous.

HABITAT: North Temperate Zone.

DISCUSSION: Drosera rotundifolia is a small, delicate plant bearing a radical rosette of tiny, round leaves and a smooth, slender stem terminating in a raceme of white flowers. The fruit is a 3-celled, many-seeded capsule.

CONSTITUENTS: Resin; sugar; citric and malic acids.

PROPERTIES AND USES: Drosera has been extolled as a remedy for whopping-cough and chronic bronchitis but is very little used in this country.

DOSE: 60 gr. (4 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Drosera, 1 fl. dr. (4 cc.).

CHAPTER LXXXV

PASSIFLORACEÆ

(păs′ĭ-flō̇-rā′sē̇-ē)

PASSION FLOWER FAMILY

This family numbers 18 genera and more than 300 species. They are woody, tendril-climbing vines or erect herbs, mostly found in the tropics. Most species bear showy flowers, distinguished by the crown of filaments borne on the throat of the calyx. The fruit is a capsule or berry.

PASSIFLORA

(păs′ĭ-flō′rȧ)

PASSION FLOWER—N.F.

Synonym: Passion Vine.

Source: Passiflora incarnata Linné (Fam. Passifloraceæ).

Etymology: Passiflora from the Lat. "passio," *passion*, from "pati, passus," *to suffer*, and "flos, floris," *flower*, i.e., the flowers are supposed to typify the passion of Jesus on the cross of Calvary.

Incarnata from the Lat. "incarnare," *to embody in human form*, from "in," *in*, and "caro, carnis," *flesh*.

Part Used: The dried flowering and fruiting top.

Description and Physical Properties: *Unground Passion Flower:* Stems glabrous or slightly pubescent above, striate, from 6 to 8 mm. in diameter, of variable length, woody, hollow, the cavity about one-half the diameter; bark very thin, greenish or purplish; wood very porous and bordered on the inner side by a thin layer of pith; fracture of the wood uneven, of the stem smooth, of the bark coarsely fibrous. Leaves more or less broken, rather thick, glabrous or often pubescent, when entire nearly orbicular in outline, base cordate, deeply three- to five-lobed, lobes ovate, finely serrate, petioles from 1 to 5 cm. in length, with two glands near the apex. Tendrils numerous and closely coiled. Flowers solitary, axillary, peduncles as long as the petioles, usually three bracted; calyx cup-shaped, with four to five lobes; lobes linear, imbricated, cuspidate; corona of the fresh flowers purplish; petals four to five, yellow; ovary oblong, stalked; stamens monodelphous in a tube about the stalk of the ovary, separated above, anthers narrow, versatile. Fruit from 4 to 5 cm. in length, an ovoid, many-seeded berry, externally green or yellow, shriveled and wrinkled; seeds flat, ovate, yellowish to brown ariled. Odor and taste slight.

HABITAT: Southern United States.

DISCUSSION: Passiflora is a perennial, herbaceous plant growing in many localities of our Southern States. It is a tendril-bearing climber frequenting fence-rows and thickets where it climbs upon the other plants present. It has alternate, palmately-lobed leaves and an abundance of large, showy flowers, blooming from May to July. The drug as seen in the market consists of the stems and leaves, the former of a yellowish- or purplish-brown color and broken into short segments. These may be glabrous or slightly pubescent externally and porous or hollow within. The leaves are 3- to 5-lobed and are of a brownish color, also glabrous or pubescent.

CONSTITUENTS: Little study seems to have been made of this drug. However, the presence of an alkaloid has been reported.

PROPERTIES AND USES: Very little therapeutic interest seems to be attached to this drug at the present time.

DOSE: 3 gr. (0.2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Tincture of Passion Flower, 15 m. (1 cc.).

CHAPTER LXXXVI

ARALIACEÆ

(ȧ-rā′lĭ-ā′sē̇-ē)

GINSENG FAMILY

THIS family contains about 50 genera and nearly 500 species. They are widely distributed, being found in North America, Asia, Australia, and Java. A number of the species are aromatic and medicinal. Among the best known are Aralia spinosa, *Hercules' Club*, and Hedera helix, the *English ivy*.

ARALIA

(ȧ-rā′lĭ-ȧ)

ARALIA—N.F.

SYNONYMS: American Spikenard; Spignet; Pettymorrel; Indian Root.
SOURCE: Aralia racemosa Linné (Fam. Araliaceæ).
ETYMOLOGY: Aralia is of unknown origin.
Racemosa from the Lat. "racemosus," *full of racemes*, referring to the manner of arrangement of the flowers.
PART USED: The dried rhizome and roots.

DESCRIPTION AND PHYSICAL PROPERTIES: *Unground Aralia:* Rhizome, oblique, about 12 cm. long and 5 cm. thick, somewhat flattened, tortuous, externally pale-brown, and often scaly, somewhat annulately roughened, frequently cut longitudinally, whitish internally; nodes approximate, each with a prominent stem scar about 3 cm. in width; fracture fibrous; roots numerous, of varying length, 5 to 25 mm. thick, furrowed, sometimes with transverse ridges and corky patches, usually cut longitudinally, light brown or purplish brown externally, whitish and spongy internally, fracture of the cortex short, of the wood short and fibrous. Odor aromatic; taste mucilaginous, pungent and slightly acrid.

HABITAT: Eastern United States, Canada.

DISCUSSION: Aralia is a perennial, herbaceous plant growing from 3 to 6 feet in height. It frequents the rich soil of woodlands as far south as Georgia and as far west as the Rocky Mountains. It has very large, ternately-compound leaves and numerous branching racemes of small, greenish flowers disposed in umbels. The rhizome is from 4 to 6 inches in length and varies from a light-brown to a dark-brown in color externally. It is white and spongy within. The rhizomes are gathered in the summer and fall. They are sometimes sliced longitudinally to facilitate drying. They have an aromatic odor and a pungent, mucilaginous taste.

Constituents: Resin; volatile oil.

Properties and Uses: Aralia is alterative, stimulant and diaphoretic and is widely employed in domestic medication in the treatment of rheumatic fevers and syphilitic conditions. Its medicinal value is not established.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Fluidextract of Aralia, 30 m. (2 cc.).
Compound Syrup of White Pine, 1 fl. dr. (4 cc.).
Compound Syrup of White Pine with Morphine, 30 m. (2 cc.).

CHAPTER LXXXVII

TURNERACEÆ

(tûr′nĕr-ā′sė̄-ē)

TURNER FAMILY

This family, numbering 6 genera and about 90 species, consists of herbs and shrubs, mostly of tropical America. The family was named in honor of William Turner (d. 1568), an English herbalist. They have alternate leaves and solitary axillary flowers, the peduncle and petiole often coherent.

DAMIANA

(dăm′ĭ-ā′nȧ)

DAMIANA—N.F.

Synonym: Turnera.

Source: Turnera diffusa Willdenow et Schultes, or Turnera aphrodisiaca Ward (Fam. Turneraceæ).

Etymology: Damiana, of uncertain origin.

Turnera, named for William Turner (d. 1568), an English herbalist.

Diffusa from the Lat. "diffundere," *to pour out, to spread,* i.e., spreads in all directions.

Aphrodisiaca from the Gr. "aphrodisios," pertaining to Aphrodite, the goddess of love and beauty and of life as expressive of the cosmic power of love, probably originally an Oriental goddess of vegetation and the reproductive forces of nature, i.e., exciting venereal desire.

Part Used: The dried leaves.

Description and Physical Properties: *Unground Damiana:* Obovate to lanceolate, 10 to 25 mm. long and from 4 to 10 mm. wide, short-petioled, obtuse or acute at the apex, and with a short, cuneate base; sharply 2- to 10-toothed on each side; the veins ascending, generally strong, straight and simple and running to the sinuses of the teeth, but sometimes branched and sending the branches into teeth; the upper surface smooth and light green or yellowish green, the lower glabrous or with a few hairs on the ribs (*Turnera aphrodisiaca*) or densely tomentose over the entire surface (*Turnera diffusa*). Intermixed with the leaves are frequently found some reddish twigs, the young tips and buds of which are grayish with appressed pubescence (*Turnera aphrodisiaca*) or white floccose (*Turnera diffusa*), also flower buds, yellowish flowers and globose pods. Odor aromatic; taste characteristic, aromatic and resinous.

HABITAT: Western Mexico, Texas.

DISCUSSION: This is a small shrub with alternate, light-green leaves of a mint-like aromatic taste. The leaves have a wedge-shaped base and vary in length from $\frac{3}{4}$ to 1 inch.

CONSTITUENTS: Volatile oil, $\frac{1}{2}$ to 1 per cent; damianin; two resins, one soft, the other hard; tannin; gum; starch.

PROPERTIES AND USES: Damiana is stimulant and tonic and is thought by many to possess aphrodisiac properties. This does not seem reasonable since it is used in Mexico in the form of an infusion, as we drink tea. When used for aphrodisiac purposes, it is usually combined with much more active drugs, such as phosphorus and nux vomica.

DOSE: 30 gr. (2 Gm.).

OFFICIAL PREPARATION: N.F. V.

Fluidextract of Damiana, 30 m. (2 cc.).

CHAPTER LXXXVIII

VERBENACEÆ

(vûr′bḗ-nā′sḗ-ē)

VERBENA FAMILY

and

ARACEÆ

(ȧ-rā′sḗ-ē)

ARUM FAMILY

The verbena family is a large one, mostly tropical, but having some representation in colder climates. They are mostly annual or perennial herbs or shrubs with erect or trailing stems, have opposite leaves, irregular corolla and terminal spikes of flowers that in some cases are very showy, for which reason they are cultivated as ornamental plants. As a general rule the plants contain little or no volatile oil and therefore are not aromatic.

The family affords but one official drug, namely, Premna arborea, which is described in the National Formulary under the title of "Tonga." Two plants, distinct not alone in respect to species, but as to family as well, constitute the official Tonga. The second plant included under this title is Epipremnum pinnatum. Both sources of this drug will be discussed under the next family, namely the Araceæ.

ARACEÆ

This is a family of endogenous plants whose spadix is inside the spathe, has neither calyx nor corolla, has leaves which in many cases are cordate and a succulent berry for its fruit. The plants are acrid and many of them poisonous. They are chiefly tropical. Members of this family are Indian turnip, skunk cabbage, calamus, and one source of Tonga. The latter is the only member of this family now official.

TONGA

(tŏn′gȧ)

TONGA—N.F.

Source: Premna arborea (Forster filius) Farwell (Fam. Verbenaceæ) and Epipremnum pinnatum (Linné) Engler (Fam. Araceæ).

Etymology: Tonga, named after the Tonga Islands.

Premna, probably a modified form of the native name.

Arborea from the Lat. "arbor," *tree*, i.e., arboreal.

Epipremnum from the Gr. prefix "epi," *upon*, and "premna," i.e., climbing upon the premna.

Pinnatum from the Lat. "pinnatus," *feathered*, from "pinna," *a feather*, i.e., pinnate or feather-like leaves.

Part Used: The bark of the former and the root of the latter of the two drugs listed under "source," and containing not more than 5 per cent of foreign organic matter.

Description and Physical Properties: *Unground Tonga:* Bark: in small chips or quills up to about 11 cm. in length, 2 cm. in width, and 3 mm. in thickness, outer surface brownish with numerous prominent, irregular, longitudinal ridges, some of which are of a pale yellow color giving the surface a striated appearence; fracture hard and short.

Root: in cylindrical pieces up to about 6 cm. in length and 3 cm. in diameter; outer surface light yellowish brown to dark brown with the light yellowish cork partially exfoliated; numerous root scars or root remains along one surface; internally very fibrous and tough. Taste slight; odor slight.

Habitat: Fiji, Tonga and other Malaysian Islands.

Discussion: As has been noted before, this drug is a mixture in equal parts of the bark of the stem and branches of one plant with the roots of the other.

Premna arborea is a tree while Epipremnum pinnatum is a climbing vine. A mixture of these drugs has long been employed as a medicine by the natives of the Fiji Islands where it is known as "*Yoro*" and "*Awalho.*"

Constituents: There is little or no exact information at the present time concerning the constituents of this drug.

Properties and Uses: This drug has been used by a few in the treatment of neuralgia, but there seems to be little at this time to justify its inclusion in the National Formulary.

Dose: 30 gr. (2 Gm.).

Official Preparations: N.F. V.

Elixir of Tonga and Salicylates, 1 fl. dr. (4 cc.).

Fluidextract of Tonga, 30 m. (2 cc.).

CHAPTER LXXXIX

ANIMAL DRUGS

All of the known animals of the earth have been classified in a manner similar to that employed in the systematic arrangement of the members of the plant kingdom. The classification is considerably more complex, however, than that of the plants. Since comparatively few drugs of animal origin are considered in this text, and a comprehensive classification would occupy considerable space, it has been thought advisable to omit it. Anyone interested in the zoological classification can find a wealth of material in the many books published on that subject.

CANTHARIS

(kăn′thȧ-rĭs)

CANTHARIDES—U.S.P.

Synonyms: Spanish Flies; Russian Flies; Blistering Flies; Blistering Beetles.

Source: Cantharis vesicatoria (Linné) De Geer (Fam. Meloideæ).

Etymology: Cantharis from the Gr. "kantharis," *a beetle.*

Vesicatoria from the Lat. "vesica," *a blister*, referring to their medicinal action.

Part Used: The dried insects containing not less than 0.6 per cent of cantharidin and not more than 10 per cent of moisture.

Description and Physical Properties: *Unground Cantharides*: From 15 to 25 mm. in length, 5 to 8 mm. in breadth, oblong, somewhat compressed above; of a brilliant green or bluish-green, metallic luster, changing in different parts, especially beneath, to a golden-green; head triangular, separated into two lateral lobes by a faint median line; mandibles stout and partly concealed; antennæ filiform, of eleven conical joints, the upper ones being black; eyes comparatively small; prothorax angulate; legs with five tarsal joints; wings membranous and brownish; elytra or wing sheaths each with two parallel lines and finely wrinkled; odor strong, disagreeable; taste slight, afterwards acrid.

Habitat: Southern Europe (Spain, Italy, Sicily, France), Western Asia.

Discussion: The insects under consideration are beetles about $\frac{2}{3}$

to 1 inch in length and of a shining, golden-green color. When living, they emit a strong penetrating, mouse-like odor. They attach themselves to trees and shrubs, mainly of the Oleaceæ and Caprifoliaceæ, feeding upon the leaves.

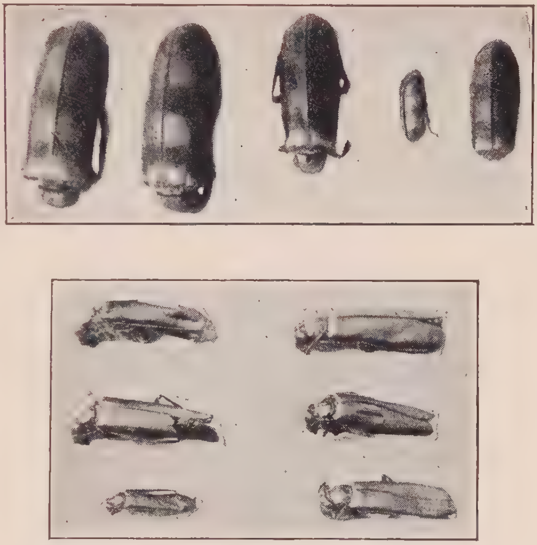


Fig. 110.—Upper, Chinese Cantharides. Lower, Russian Cantharides.

During the latter part of June the female insects lay their eggs in small holes which they make in the ground. The larvæ, which are about a millimeter in length, hatch in the course of a week. They soon find their way out of the soil, but after about a month, again bury themselves in the ground to develop into the chrysalis stage and to hatch out the following spring as mature beetles.

The beetles attack trees in large swarms and are collected therefrom in the early morning while they are too cold to fly. People collect them by first spreading sheets under the trees, then shaking the trees whereupon the insects, having become torpid by the chill of the night, are easily shaken off and fall upon the sheets. They are then killed by submerging them in vinegar or exposing them, in sieves, to the vapor of carbon bisulphide, chloroform, ether or of boiling vinegar. They are then dried, either in the sun or by artificial heat. 2007 pounds of cantharides were imported during 1924.

Constituents: Cantharidin, $C_{10}H_{12}O_4$, 0.4 to 1 per cent, is the irritating, blistering principle. There is also formic, acetic and uric acids and a volatile principle to which the odor is due.

Properties and Uses: Cantharides is stimulant, rubefacient, counter-irritant and epispastic. All of these effects are dependent upon the fact that it irritates the tissues with which it comes in contact, and indeed, its other properties, such as diuretic, emmenagogue and aphrodisiac, are dependent upon the same action.

If applied to the scalp as an ingredient of hair-tonics, scalp applications or the so-called "hair-restorers," it increases the blood supply to the scalp and stimulates the hair follicles, both favoring the growth of hair. It acts similarly when applied to the skin.

The irritation produced may be regulated by the concentration of the preparation applied, or by the length of time it is left on, so that any degree of irritation from that of a mild stimulant to severe blistering, or even pustulation, may be had. Thus it is applied externally as a stimulant or counter-irritant to relieve pain, prevent the accumulation of inflammatory products, or revive suppressed discharges, thus relieving internal congestion. Preparations of cantharides are applied for their counter-irritant or blistering action in pleurisy, pneumonia, hydrocele, gleet, neuralgia, rheumatism and a large variety of other conditions.

When used as a blister, the application ordinarily is allowed to remain from four to eight hours, or until the skin becomes sufficiently vesicated. If the part is first cleansed with soap, and vinegar applied, the length of time required for vesication will be shortened.

When taken internally, cantharides is eliminated in part by the bronchial mucous membrane, but to a greater extent by the urinary tract. The irritation produced during its elimination renders it useful in bronchitis and in some conditions of the genito-urinary tract. Because of its irritant qualities its use is attended with danger, especially to the kidneys, as it may set up nephritis.

Official Preparations: U.S.P. X.

Cantharides Cerate.
Cantharides Plaster.
Tincture of Cantharides, 1½ m. (0.1 cc.).

COCCUS

(kŏk′ŭs)

COCHINEAL—U.S.P.

Source: Coccus cacti Linné (Fam. Coccidæ).

Etymology: Cochineal from the Sp. "cochinilla," the native name of the insect. The term signifies "*wood louse.*"

Coccus from the Gr. "kokkos," *a grain* or *berry*, referring to the appearance of the insect.

Cacti from the Gr. "kaktos," *a prickly plant*, i.e., the insects inhabit several species of cactus.

Part Used: The dried female insect enclosing the young larvæ.

Description and Physical Properties: *Unground Cochineal:* Somewhat ovate in outline, convex above, concave beneath, from 3.5 to 5 mm. in length, consisting of from 9 to 12 segments; externally grayish-purple or grayish; in the shell-like, somewhat horny abdomen lie numerous larvæ less than 1 mm. in diameter; the mature larvæ with 8-jointed antennæ, 3 pairs of legs, the lower having from 6 to 8 segments, and a characteristic beak or rostrum composed of 4 thread-like parts which pair off into 2 coils; easily pulverizable; odor characteristic; taste slightly bitter.

HABITAT: Mexico and Central America. Cultivated in Southern Spain, the West Indies, and Algiers.

DISCUSSION: The male is about one-half the size of the female and has two erect wings, while the female is wingless. They feed upon several species of cactus, to which the females attach themselves. After copulation the female insect secretes itself partly within the stem or leaf of the cactus. Several thousand eggs are produced. The insect now dies and the eggs are hatched by the heat of the sun while yet within the body of the parent insect.

The insects do not withstand the rainy season very well, so during this period of the year a quantity of them are preserved upon plants under cover and then distributed, after the cessation of the rains, upon out-door plants. The young insects are allowed to develop until the females have become fecundated and enlarged. At this stage the insects that are to be prepared for the market are collected by scraping them off the leaves of the plant into bags, generally by the use of a feather. They are now either dipped into boiling water to remove the wax or they are killed by sulphur fumes, the wax being retained. In either case they are subsequently dried by the heat of the sun or in ovens. The hot-water process produces the "*black-grain*" cochineal of the market, while the sulphur-fume process yields the "*silver-grain*" product.

There are five or six generations and consequently five or six collections of the wild insects each year, but only three of the cultivated insects. On grinding, cochineal yields a carmine-colored powder. This, treated with salts of tin, gives a rich scarlet-red dye. During the year 1924, 95,368 pounds of cochineal were imported.

CONSTITUENTS: Carminic acid, $C_{22}H_{22}O_{13}$, 9 to 10 per cent. The coloring matter is an alkaline salt of this acid and is contained only in the fatty parts of the insect and in the yolks of the eggs.

PROPERTIES AND USES: Cochineal was thought to be of some value in neuralgia and whooping-cough, but is rarely employed except as a coloring agent. As such it is used in pharmaceutical and toilet products; also as an indicator in alkalimetry. Large quantities of cochineal are utilized for the recovery of carminic acid.

OFFICIAL PREPARATION: U.S.P. X.

Compound Tincture of Cardamom, 1 fl. dr. (4 cc.).

(*a*) CERA ALBA

(sē′rȧ ăl′bȧ)

WHITE WAX—U.S.P.

(*b*) CERA FLAVA

(sē′rȧ flā′vȧ)

YELLOW WAX—U.S.P.

(*c*) MEL

(mĕl)

HONEY—U.S.P.

Synonyms: (*a*) White Beeswax.
(*b*) Beeswax; Yellow Beeswax.

Source: (*a*) and (*b*) The honeycomb of the bee, Apis mellifera Linné (Fam. Apidæ).

(*c*) Honey is the saccharine secretion deposited in the honeycomb by the bee.

Etymology: Apis, the Lat. for *bee*, from the Gr. "empis," *a giant*, the classical name of the insect.

Mellifera from the Lat. "mel," *honey*, and "ferre," *to bear*.

Wax from the Anglo-Saxon "weax," the name of the substance from which the honeycomb is made.

Description and Physical Properties: (*a*) A yellowish-white solid, somewhat translucent in thin layers. It has a faint, characteristic odor, is free from rancidity, and is nearly tasteless.

(*b*) A solid, varying in color from yellow to grayish-brown. It has an agreeable, honey-like odor, and a faint, characteristic taste.

When cold, it is somewhat brittle, and when broken presents a dull, granular, non-crystalline fracture. It becomes plastic from the heat of the hand.

Yellow Wax is insoluble in water and sparingly soluble in cold alcohol. Boiling alcohol dissolves the cerotic acid and a portion of the myricin, which are constituents of Yellow Wax. It is completely soluble in chloroform, ether, and in fixed or volatile oils, partly soluble in cold benzene or in carbon disulphide, and completely soluble in these liquids at about 30° C.

(*c*) A thick, syrupy liquid of a light yellowish or yellowish-brown color. It is translucent when fresh, but frequently becomes opaque and granular from crystallization of dextrose. It has a characteristic odor and a sweet, faintly acrid taste.

Discussion: The honey bee has been carefully propagated in hives for its honey and wax since very remote times. The former was used as a food product, as a sweetening agent as we now use sugar, also as a saccharine crude material to be fermented into an alcoholic beverage. Both honey and wax are obtainable from the wild honey bee with which we are all familiar.

Honey bees live in swarms consisting of 10,000 up to several times that number of individuals which are divided into three classes, namely: (1) the perfect female or queen bee, (2) the undeveloped females or neuters which are the working bees and (3) the males or drones. The queen bee is much larger than the others, is the only queen in the swarm, and has the task—her only one—of reproducing the species by laying some 2000 eggs each day during the laying season. Upon her death another queen is selected from the three-day old females to take her place.

Each swarm has several hundred drones, which, as their name implies, do no work, but whose function it is to fertilize the queen after which they are killed by the working bees.

The neuters gather the nectar of flowers by means of their long proboscides. It is first swallowed and undergoes a fermentation in the stomach of the bee where it is changed to honey and then deposited in the cells of the honeycomb. The neuters have a barbed sting attached to a sac of poison which flows into the wound causing severe pain. When the hive becomes over-stocked, a new colony is sent out under the direction of a queen and establishes its own habitation.

How long honey bees have been kept for the production of honey is unknown, but it is certain that the ancient Egyptians had the art of bee culture well developed, for we read that they kept floating apiaries on the River Nile. Hives for these colonies were built on rafts and placed on the water to save space, and as the season progressed, they were floated down the river and anchored in promising localities following the successive blooming of the flowers. The importation of white and yellow beeswax during the year 1924 amounted to 3,096,413 pounds.

Constituents: (*a*) and (*b*) White and yellow wax: Formerly beeswax was thought to be made from the pollen of flowers, but it is now known to be a secretion from honey. Beeswax is essentially a mixture of three substances which may be separated from one another by alcohol. These substances are: (1) myricin which consists chiefly of myricyl palmitate, i.e., a compound of myricyl alcohol and palmitic acid. It is insoluble in boiling alcohol. (2) cerotic acid, $C_{26}H_{52}O_2$, which is dissolved out of the wax by boiling alcohol, but crystallizes from the alcohol on cooling. (3) cerolein, which is probably a mixture of fatty acids. This remains dissolved in the cold alcohol.

White wax is made by bleaching the yellow wax. This is done by exposing it, in thin layers, to the combined influence of the air, moisture and sunlight. This is accomplished by allowing the melted wax to flow slowly upon wetted cylinders, whereupon it hardens, forming thin, ribbon-like layers. It is then removed and spread upon linen cloths stretched upon suitable frames. It is kept wet and exposed to the air and light until the wax is sufficiently bleached.

Honey consists of from 50 to 94 per cent of invert sugar. The dextrose (grape sugar) will crystallize out under certain conditions, as cold weather or long storage, leaving the levulose in a liquid condition. It may also contain from 0.1 to 10 per cent of sucrose, from 1 to 10 per cent of dextrin and small amounts of protein and formic acid. Water content varies from 8 to 30 per cent.

Properties and Uses: The practical employment of beeswax in medicine is limited to its use as a base in ointments, cerates and plasters. It sometimes enters into the composition of cold creams and pomades to lend consistency, and the pharmacopœia permits that as much as 5 per cent be added to benzoinated lard for the same purpose. It is largely employed in the manufacture of shoe polishes, leather dressings, etc.

Honey is seldom used medicinally, except as a vehicle, for which its action is very similar to that of syrup. It probably has more of a laxative action on the bowel than syrup. It is employed pharmaceutically as an excipient in the manufacture of some pills.

Official Preparations: U.S.P. X.

Cerate (white wax).
Ointment of Rose Water (white wax).
Cantharides Cerate (yellow wax).
Rosin Cerate (yellow wax).
Ointment (yellow wax).
Ointment of Boric Acid (yellow wax).
Ointment of Belladonna (yellow wax).
Ointment of Phenol (yellow wax).
Ointment of Tar (yellow wax).

HIRUDO

(hĭ-rōō′dō)

LEECHES

Synonyms: Speckled Leeches; Green Leeches.

Source: Hirudo medicinalis Linné, is the "*speckled leech*," and Hirudo quinquestriata Schmarda is the "*five-striped*" or "*Australian leech*" (Order Gnathobdellida).

ETYMOLOGY: Hirudo from the Lat. "hirudo, hirudinis," *a leech.*

Medicinalis, the Lat. equivalent of "medicinal," i.e., curative or alleviative.

Quinquestriata from the Lat. "quinque," *five,* and "striata," *striped,* i.e., having five stripes.

Gnathobdellida from the Gr. "gnatho," *jaw,* and "bdella," *a leech,* i.e., a division of leeches in which there is no proboscis. Three jaws bearing teeth and forming a triangular mouth is the usual arrangement.

HABITAT: In marshes and running streams in all temperate climates.

DISCUSSION: The leech is a segmented, dorso-ventrally flattened worm, 2½ to 5 inches long, inhabiting fresh waters. It has two suckers, one at the anterior end which contains the mouth and another at the posterior end. It moves about by alternately elongating and attaching itself to an object by means of one of its suckers and contracting its body. The mouth has three jaws provided with sharp, fine, chitinous teeth for biting into blood vertebrates. It sucks blood from its victim by dilatation of its muscular pharynx and is capable of holding about three times its weight of that fluid. Blood continues to flow for some time after the leech has dropped off or has been removed because the animal secretes from glands opening near the jaws a substance that prevents coagulation. Since it takes the worm from six to nine months to digest so large a quantity of blood it can be used medicinally but once in such a period of time. American leeches are said to abstract about 80 minims while European varieties take from ½ to 1 ounce of blood. They usually remain attached until they are gorged or are removed by shaking a little salt on them.

Although leeches are hermaphroditic, the eggs of one are fertilized by the spermatozoa of another. The eggs are laid in shallow water and hatched out by the heat of the sun. They may be kept alive and in good condition for a long time by placing them in moist moss or earth, or, better, in fresh, clean, soft water of nearly uniform temperature. During 1924, 399,570 leeches were imported. The declared valuation was $8345.

USES: The only use leeches have in therapeutic practice is for the local abstraction of blood to relieve local congestions and inflammations. This may be necessary, or at least, desirable, in cases where, on account of injuries, the vessels have been ruptured and the blood diffused into the connective tissue. The point at which the application is to be made should be cleansed and freed from hair, and if it be desired to restrict the application to a certain spot, a piece of wetted filter paper with a small hole through it should first be applied, and then the leech placed over the aperture. In case they do not bite readily, they may be induced to do so by first moistening the spot with a drop of blood or milk.

MOSCHUS

(mŏs′kŭs)

MUSK—U.S.P. IX

SYNONYMS: Tonquin Musk; Deer Musk; Chinese Musk; Thibet Musk.

SOURCE: Moschus moschiferus Linné (Fam. Moschidæ).

ETYMOLOGY: Moschus and musk from the Gr. "moskhos," from the Sanskrit "mushka," *a testicle* (originally *a little mouse*), referring to the form of its occurrence in the musk sac.

Moschiferus from the Lat. "moschus," *musk*, and "ferre," *to bear*, i.e., musk-bearing.

PART USED: The dried secretion from the preputial follicles of the musk deer.

DESCRIPTION AND PHYSICAL PROPERTIES: Usually in small irregular granules, not more than 2 mm. in thickness, blackish with a few brown fragments and becoming somewhat grayish on aging; glistening and somewhat oily; odor peculiar, penetrating, powerful and persistent; taste somewhat bitter.

HABITAT: Central Asia from India to Siberia, especially in Tonquin and Thibet in the Himalaya Mountains.

DISCUSSION: The musk deer is a small animal some 3 feet in length and about 2 feet in height. It resembles closely our common deer except for its size and the fact that it has no antlers. It inhabits the mountainous regions of Central Asia, frequenting the snowy recesses and most inaccessible crags of the mountains. It conceals itself during the daytime, choosing the night to search for its food.

The upper jaw of the musk deer is provided with two hooked tusks which serve to pull roots from the ground. The animal is hunted for its hide as well as for the musk, and it is estimated that 20,000 are slain each year. The musk is contained in an oval projecting sac, found only in the male and situated between the umbilicus and the prepuce. Sometimes as much as six drachms of musk are contained in a "pod" from a vigorous adult animal, none being found in the young and a small amount in the old male. The importation of musk for 1924 was 1162 pounds. Its declared value was $150,969.

CONSTITUENTS: Volatile oil, muskone, 0.5 to 2 per cent; cholesterin; fat; wax; albumins.

PROPERTIES AND USES: The principal therapeutic properties that have been attributed to musk are those of an anodyne and antispasmodic. It is said to have some value in spasmodic conditions such as whooping-cough, spasmodic croup, hiccough and hysterical convulsions, but is little used. Its use is restricted almost entirely to perfumes, in which it is used as a fixative.

DOSE: 4 gr. (0.25 Gm.).

CETACEUM

(sĕ-tā′shĕ-ŭm)

SPERMACETI—U.S.P.

SOURCE: The head of the sperm whale, Physeter macrocephalus Linné (Fam. Physeteridæ).

ETYMOLOGY: Cetaceum from the Lat. "cetus," *whale.*

Spermaceti from the Lat. "sperma," *spermatozoön* or *spermatozoid,* from the Gr. "speirein," *to sow,* and "ceti," the genitive of "cetus," *a whale.*

Physeter from the Gr. "physeter," *a blow-pipe,* from "physa," *a pair of bellows,* from "physæ," *to blow,* referring to the fact that the sperm whale has a blow-hole near the edge of the snout through which it ejects water to a considerable height.

Macrocephalus from the Gr. "makros." *large,* and "kephale," *head,* i.e., having a large head.

PART USED: A fatty substance obtained from the head.

DESCRIPTION AND PHYSICAL PROPERTIES: White, somewhat translucent, slightly unctuous masses, having a crystalline fracture, and a pearly luster. It has a very faint odor and a bland, mild taste. It is free from rancidity.

Spermaceti is insoluble in water, nearly insoluble in cold alcohol, and only slightly soluble in cold petroleum benzin. It is soluble in boiling alcohol, ether, chloroform, carbon disulphide, and in fixed or volatile oils.

HABITAT: The warmer portions of all the oceans, especially the Pacific and Indian Oceans.

DISCUSSION: Spermaceti is a white, unctuous, fatty substance obtained from the cavity in the upper jaw of the sperm whale. This cavity is situated just in front of the cranium. This animal usually grows to a length of 60 or 65 feet (sometimes 75 or 80 feet) and has an enormous head. The head is usually about one-third of its total length and 30 feet in circumference, and has a closed cavity called the "*case,*" containing fluid spermaceti and oil. Its lower jaw is provided with a series of large conical teeth, while the upper jaw has no functional teeth. It is the only whale having a throat large enough to admit a man.

The cavity or "*case,*" is divided into large cells which contain the oily liquid that congeals upon the death of the animal into a white, spongy mass of spermaceti mixed with oil. This liquid is removed by means of buckets and is placed in barrels, ordinarily twelve or thirteen barrels being required to hold the product from one head. After the spermaceti has concreted it is freed from the oil by means of expressing and washing with a weak, boiling lye solution which saponifies the oil.

CONSTITUENTS: Spermaceti consists mainly of cetylic alcohol ($C_{16}H_{33}OH$) in combination with palmitic acid ($HC_{16}H_{31}O_2$). The resultant ester is the fat, cetin (cetyl palmitate).

PROPERTIES AND USES: Spermaceti is a soothing emollient and is employed chiefly to give firmer consistence to ointments, cerates and creams.

OFFICIAL PREPARATION: U.S.P. X.
Ointment of Rose Water.

OLEUM MORRHUÆ

(ō′lē̇-ŭm mŏr′o͞o-ē)

COD LIVER OIL—U.S.P.

SYNONYMS: Cod Oil; Oleum Jecoris Aselli.

SOURCE: Gadus morrhua Linné, and other species of Gadus.

ETYMOLOGY: Morrhua, N. Lat. for "*codfish,*" from the Fr. "morue," *a codfish.*

Gadus, also Lat. for "*codfish,*" from the Gr. "gados," the name of a species of fish.

Jecoris from the Lat. "jecur, jecoris," *liver.*

Asellus, the Lat. name of a species of fish, probably the cod.

PART USED: The fixed oil obtained from the fresh livers. The U.S.P. X. makes the following statement: "Cod Liver Oil may be assayed for its vitamine A potency, and should then contain at least 50 units per Gm. Cod Liver Oil so assayed must be labeled 'This unit is not a measure of the antirachitic activity of Cod Liver Oil.'"

DESCRIPTION AND PHYSICAL PROPERTIES: A pale-yellow, thin, oily liquid. It has a peculiar, slightly fishy, but not a rancid odor, and a fishy taste.

Cod Liver Oil is slightly soluble in alcohol, but is soluble in ether, chloroform, carbon disulphide, and in ethyl acetate.

HABITAT: North Atlantic Ocean along the shores of New England, Nova Scotia, Newfoundland, Norway.

DISCUSSION: Codfish grow from 2 to 3 feet in length and occur in large numbers off the coasts of the afore-named countries. There are two general methods employed in catching them, both using long lines with baited hooks as the immediate means. In the first method, "*mother ships*," with small boats aboard, go out to sea for weeks at a time. They select a suitable fishing ground, drop anchor, and crews, usually of two men, put off for the day in the small boats, returning to the mother ship at night with their day's catch. The fish are cleaned and salted on board ship, offal being thrown over-board or used as bait. The livers are thrown into barrels and allowed to decompose, thus disintegrating the tissue and allowing the oil to separate and rise to the surface. It is then racked off and bottled for the market. This yields the grade of oil known commercially as "*straits*" or "*brownish-yellow*" oil. The débris remaining in the barrels is then heated with water or steam, causing more oil to separate. This is known as "*banks*" or "*dark-brown*" oil and is the poorest commercial variety.

The other method of fishing for the cod is done entirely with small boats, each containing two or three fishermen, who leave shore in the morning, fishing all day and returning in the evening. They clean and salt the fish and collect the livers after their return in the evening. The livers are then treated for the recovery of the oil. If this recovery is made at home, it is done by simply boiling the livers with water until the tissue becomes disintegrated, whereupon the oil separates and rises to the top. Much of the oil, however, is recovered at plants built especially for that purpose and to which the livers are sent in refrigerator cars from the fisherman villages along the coast. Here the livers are cooked by enclosed steam in vats in an atmosphere of carbon dioxide to prevent oxidation. This oil is then solidified by freezing, expressed through canvas and bottled for the market. It is the best grade and is known as "*shore*," "*white*" or "*pale-yellow*" oil. 930,931 gallons of cod liver oil were imported during 1924.

CONSTITUENTS: Cod liver oil consists chiefly of olein (70 per cent) and palmitin (25 per cent) with a little stearin, palmitic, myristic and jecoleic acid. Traces of iodine, bromine, chlorine, sulphur, phosphorus and the three alkaloids, trimethylamine, aselline and morrhuine, are also present. Perhaps the most important constituents of all are the oil-soluble vitamines A and D. See Appendix, page 523.

PROPERTIES AND USES: Cod liver oil is used as an alterative and nutritive in malnutrition, underdevelopment, rickets, tubercular conditions, chronic bronchitis and other nutritional and wasting diseases. It is one of the most easily digested of the fats and promotes constructive metabolism and the formation of red blood-corpuscles. It is acted upon in the duodenum by the pancreatic juice which breaks it up into glycerin and the fatty acids. These acids then unite with the alkalies of the bile and the succus entericus, forming soaps which then act as lubricants to the bowel. In cases where the oil becomes unbearable to the stomach, it may be administered by inunction, being applied to the abdomen or the groins.

Cod Liver Oil was used for many years in an empirical way. Clinical experience had demonstrated its value in wasting diseases. It was known to be superior in these conditions to any other fat, but the correct reason for this effect was not known until the discovery of vitamines.

Vitamines are known as "accessory food substances," "accessory factors" or "food essentials" and exist in varying proportions in a great many of our natural foods. For a discussion of vitamines see Chapter XC, page 522. At this time it is necessary to point out only that cod liver oil contains the two oil-soluble vitamines A and D, known respectively as antixerophthalmic and antirachitic vitamines.

Oil-soluble vitamine A favors growth and development of the softer tissues while oil-soluble vitamine D favors the development of strong bones and teeth. Because of the abundance of vitamine A in cod liver oil, it is valuable as a flesh builder in a wide variety of wasting diseases. As vitamine D has to do with the efficient utilization of calcium, cod liver oil plays an important rôle in the prevention and cure of rickets since that condition results from a lack of calcium in the bones. It also helps materially in the formation of hard, strong teeth. Because of its function of utilizing calcium effectively it is fed with pronounced success to hens to foster egg production. The best of results have attended the experimental feeding of this oil to cows to increase the yield of milk.

DOSE: 2½ fl. dr. (10 cc.).

OFFICIAL PREPARATION: U.S.P. X.

Emulsion of Cod Liver Oil, 4 fl. dr. (15 cc.).

ADEPS

(ăd′ĕps)

LARD—U.S.P.

SYNONYMS: Hog's Lard; Prepared Lard.

SOURCE: The fat of the abdomen of the hog, Sus scrofa var. domesticus Gray (Fam. Suidæ).

ETYMOLOGY: Adeps, the Lat. for *animal fat.*

Sus from the Gr. "us," *hog.*

Scrofa, the Lat. for *breeding sow.*

Domesticus, the Lat. for *domesticated,* from "domus," *house* i.e., belonging to the household.

Lard from the Lat. "lardum," *pig's fat*, from the Gr. "larinos," *fatted*.

PART USED: The purified internal fat of the abdomen.

DESCRIPTION AND PHYSICAL PROPERTIES: A soft, white, unctuous mass, having a faint odor, and a bland taste. It is free from rancidity.

Lard is insoluble in water; very slightly soluble in alcohol; readily soluble in ether, chloroform, carbon disulphide, and in petroleum benzin.

HABITAT: Universal, domesticated.

DISCUSSION: Only the fat from the winter-killed animals should be used and it should be collected only from the abdominal cavity, i.e., the mesenteric fat and that from about the kidneys. It should first be freed from blood and membranous tissue, then melted at as low a temperature as possible and strained. If too high a temperature is employed, the fat will show a yellowish color and become acrid. Heating over a water bath will obviate this, and the heat must be continued until the fat is freed from water.

CONSTITUENTS: Lard consists of olein, 60 per cent, palmitin and stearin, 40 per cent, these being compounds of the corresponding fatty acids and glycerol.

PROPERTIES AND USES: Lard is a soft, unctuous solid of bland taste and emollient action. It may be used, *per se*, as an emollient protective against friction or chafing, but finds its greatest employment as a base for ointments and cerates.

OFFICIAL PREPARATIONS: U.S.P. X.
Lead Oleate Plaster.
Benzoinated Lard.

(*a*) OVI ALBUMEN RECENS

(ō′vĭ ăl-bū′mĕn rē′sĕnz)

FRESH EGG ALBUMEN—N.F.

(*b*) OVI VITELLUM RECENS

(ō′vĭ vĭ-tĕl′ŭm rē′sĕnz)

FRESH EGG YOLK—N.F.

(*c*) OVUM GALLINACEUM

(ō′vŭm găl′ĭ-nā′sē-ŭm)

FRESH EGG—N.F.

SYNONYMS: (*a*) White of Egg.
(*b*) Yolk of Egg.
(*c*) Hen's Egg.

Source: Gallus domesticus Temminck (Fam. Phasianidæ).

Etymology: Ovi and ovum, genitive and nominative, respectively, of the Lat. "ovum," *egg*.

Albumen from the Lat. "albus," *white*, i.e., the white of egg.

Recens, recentis, the Lat. for *recent* or *fresh*.

Vitellum from the Lat. "vitellus," *the yolk of an egg*.

Gallus and gallinaceum from the Lat. "gallina," *a hen* ("gallus," *a cock*), i.e., that group of fowls of which the hen is the type.

Domesticus from the Lat. "domus," *house*, i.e., at home or domesticated.

Phasianidæ from the Lat. "phasianus," *pheasant*, from the Gr. "phasianos," *the Phasian bird* or *pheasant*, from "Phasis," *a river in Colchis*, its native home.

Habitat: Domesticated in nearly all parts of the world.

Discussion: Both the hen and her eggs are too common to require much of a description here. The white of the egg is an almost colorless, viscid liquid contained in a very delicate tissue or membrane lining the egg shell. It has little or no odor or taste and is completely soluble in water.

The yolk of the egg is a natural emulsion and has a bland oily taste. It is but partially soluble in water.

Constituents: (*a*) Egg albumen consists of approximately 85 per cent of water, 12 per cent of protein matter, 2.5 per cent of ovomucoid (a mucin-like body), and traces of mineral salts.

(*b*) Yolk of egg consists of approximately 51.8 per cent of water, 15.8 per cent of a protein matter known as "vitellin," or more specifically "ovovitellin," 1.5 per cent of nuclein (a compound protein rich in phosphorus), 20.3 per cent of fats (olein, palmitin, and stearin), 0.4 per cent of cholesterin, 1.2 per cent of phosphoglyceric acid, 7.2 per cent of lecithin (a complex, waxy, crystallizable body also found in brain and nerve tissue and in the white blood corpuscles), 0.3 per cent of cerebrin (a peculiar substance also found in brain and nerve tissue), 1.0 per cent of salts, vitamines A, B, and C, and 0.5 per cent of coloring matter.

Properties and Uses: (*a*) White of egg has long been used as a clarifying agent. Its employment in the preparation of coffee and home-made syrups, especially maple syrup, for the purpose of clarification, is well-known. It has also been recommended as an antidote in cases of poisoning by corrosive agents. Here it is thought to combine with the agent itself, thus lessening its corrosive action, and to protect the tissues mechanically.

(*b*) Yolk of egg makes an excellent emulsifying agent for preparations that are to be consumed within a short time.

(*c*) The food value of hen's eggs is well-known. Many biochemists regard them as an important source of some of the constituent parts of the brain and nerve tissue.

Official Preparations: N.F. V.

(*a*) Fresh Egg Albumen:
  Compound Liniment of Opium.
(*b*) Fresh Yolk of Egg:
  Glycerite of Egg Yolk.
(*c*) Fresh Egg:
  Acetic Turpentine Liniment.

PEPSINUM

(pĕp-sī′nŭm)

PEPSIN—U.S.P.

Source: The glandular layer of the fresh stomach of the hog, Sus scrofa var. domesticus Gray (Fam. Suidæ).

Etymology: Pepsin from the Gr. "pepsis," *a cooking, digesting, digestion,* from "peptein," *to cook* or *digest,* referring to its action on the food.

Part Used: Pepsin is a substance containing a proteolytic enzyme (ferment) obtained from the glandular layer of the fresh stomach of the hog.

Description and Physical Properties: Lustrous, white or pale yellow, transparent or translucent scales, granules or spongy masses, or a fine, white or cream-colored, amorphous powder, free from any offensive odor, and having a slightly acid or saline taste. It is not more than slightly hygroscopic.

Pepsin is freely soluble in water, the solution being more or less opalescent. It is nearly insoluble in alcohol, chloroform, and ether.

Dry Pepsin is not injured by heating to 100° C. The activity of Pepsin in solution is destroyed by alkalies or by temperatures exceeding 70° C.

Discussion: Stomach linings (covering about $\frac{1}{3}$ of the stomach walls) are digested with hydrochloric acid, the resulting product clarified, concentrated in a high vacuum, dialyzed, concentrated still further and either poured out on glass plates to dry, forming scale pepsin, or precipitated and reduced to dryness in vacuum evaporators to form the porous or spongy pepsin.

Another method is to precipitate the pepsin after the digestion of the linings by means of sodium sulphate, yielding a tough, stringy product which is subjected to drying and powdering.

Most of the pepsin made at present is the spongy kind. It possesses the advantage of being less hygroscopic, of dissolving more rapidly and of yielding a clearer solution than pepsin made by any other method.

The production of high-grade pepsin involves a very technical process requiring special equipment, a great deal of experience and close attention to detail.

While the official product is capable of digesting at least 3000 times its weight of freshly coagulated and disintegrated egg albumen, pepsin four to five times as active is produced in commercial quantities.

PROPERTIES AND USES: The only medicinal use made of pepsin is as an aid to gastric digestion. It is employed in cases where there is a deficiency in the secretion of gastric juice, and in convalescence from long illness. It may be administered in very dilute (0.2 per cent) solution of hydrochloric acid, or given in pill or powder form and followed in about one-half hour by the diluted acid.

DOSE: 8 gr. (0.5 Gm.).

PANCREATINUM

(păn-crē-ă-tī′nŭm)

PANCREATIN—U.S.P.

SOURCE: The fresh pancreas of the hog, Sus scrofa var. domesticus Gray (Fam. Suidæ) or of the ox, Bos taurus Linné (Fam. Bovidæ).

ETYMOLOGY: Pancreatin from the Gr. "pas, pan," *all* and "kreas," *flesh, meat.*

PART USED: Pancreatin is a substance containing enzymes, principally amylopsin, trypsin, and steapsin, obtained from the fresh pancreas of the afore-named animals. The pharmacopœia requires that pancreatin be capable of converting not less than 25 times its weight of starch into soluble carbohydrates and not less than 25 times its weight of casein into proteoses. It provides that pancreatin of a higher digestive power may be brought to this standard by admixture with lactose.

DESCRIPTION AND PHYSICAL PROPERTIES: A cream-colored, amorphous powder, having a faint, characteristic, but not offensive odor.

Pancreatin is slowly and incompletely soluble in water; insoluble in alcohol.

Pancreatin changes proteins into proteoses and derived substances, and converts starch into dextrins and sugars. Its greatest activities are in neutral or faintly alkaline media; more than traces of mineral acids or large amounts of alkali hydroxides render it inert. An excess of alkali carbonates also inhibits its action.

DISCUSSION: It is probable that none of the published methods are used on a commercial scale in the manufacture of either pancreatin or animal diastase. Every manufacturer works out his own process at a very considerable cost for which reason he guards it more or less carefully. For that reason the methods generally given are not feasible for commercial production but will yield small amounts of more or less active material for experimental purposes. Pancreatin is obtained from the fresh pancreas and the methods used are quite similar to those employed in the production of pepsin. Thus it is finely chopped and macerated in water to which a little hydrochloric acid has been added. The pancreatin may be precipitated out of the solution either by the addition of salt or alcohol. The precipitate is then dried at 40° C. and powdered.

Constituents: As stated before pancreatin contains a number of enzymes, principally amylopsin or amylase, trypsin, and steapsin, also known as lipase or ptyalin. Amylopsin changes starch into maltose and dextrin. Trypsin digests proteins into peptones. Steapsin splits fats into fatty acids and glycerin.

Properties and Uses: Pancreatin is used as an agent to peptonize or pre-digest foods for invalids and those prostrated from fevers or wasting disease; also as an aid to digestion.

Dose: 8 gr. (0.5 Gm.).

FEL BOVIS

(fĕl bō′vĭs)

OXGALL—U.S.P.

Synonym: Ox Bile.

Source: The ox or cow, Bos taurus Linné (Fam. Bovidæ).

Etymology: Bos, bovis, the Lat. for *ox* or *cow*, from the Gr. "bous," *an ox.*

Taurus, the Lat. for *bull*, from the Gr. "tauros," *a bull.*

Fel, the Lat. for *gall*, from the Gr. "khole," *bile.*

Part Used: The fresh bile from the gall-bladder.

Description and Physical Properties: A brownish-green or dark green somewhat viscid liquid, having a characteristic odor, and a disagreeable, bitter taste.

Habitat: Universal, domesticated.

Discussion: Bile is secreted by the liver. In life it passes into the intestines where it aids in the digestive processes by emulsifying fats, promoting peristalsis and absorption, and preventing putrefactive changes.

The fresh bile is purified by adding alcohol to it, slowly and with constant stirring, to precipitate the mucus and the albuminous matter. After filtering, the clear solution is evaporated to dryness, powdered and then sufficient starch is added to yield one-eighth of the weight of the fresh bile so purified.

Constituents: Oxgall contains a large number of constituents, the most important being the sodium and potassium salts of glycocholic and taurocholic acids, sometimes called "bile salts."

Properties and Uses: Oxgall is a cholagogue, laxative and intestinal antiseptic. It is given in cases of constipation where there is reason to suspect that the biliary secretion is deficient. It is also employed in jaundice and those forms of dyspepsia accompanied by lack of proper biliary secretion.

Official Preparation: U.S.P. X.

Extract of Oxgall, 6 gr. (0.4 Gm.).

RENNINUM

(rĕn-ĭn′ŭm)

RENNIN—N.F.

Synonym: Rennet.

Source: The glandular layer of the stomach of the calf, Bos taurus Linné (Fam. Bovidæ).

Etymology: Rennin from the Anglo-Saxon "gerinnan," *to curdle* or *coagulate*, referring to its action on milk.

Part Used: The partially purified milk-curdling enzyme obtained from the glandular layer of the stomach and capable of coagulating not less than 25,000 times its weight of fresh milk.

Description and Physical Properties: Rennin occurs as a grayish white or yellowish white powder, or as pale yellow grains or scales having a characteristic and slightly saline taste and a peculiar, not unpleasant odor. It is slightly hygroscopic.

It is slowly soluble in water and in diluted alcohol, the solutions being more or less opalescent.

Habitat: Universal, domesticated.

Discussion: Rennin may be obtained from the glandular layer of the stomach, finely minced, by macerating for several days in salt solution containing a preservative, as boric acid. After straining, more salt is added to the clear solution to precipitate the enzyme. This is dried and powdered and constitutes the rennin of the market.

Most of the rennin used in this country until recently has been imported from Denmark and the exact method of its manufacture is kept a trade secret.

Properties and Uses: Rennin is used in the preparation of food for the sick or convalescent. Frequently it is employed in combination with pepsin, the essence of pepsin containing rennin being the most common form. This combination is added to milk which it coagulates. This coagulated milk is given as a food, *per se,* or the casein strained out and the whey administered alone.

Comparatively little rennin is used in pharmaceutical preparations. The greatest bulk is used to coagulate milk in the manufacture of cheese. During the world war pepsin was used for this purpose because of the scarcity of rennin.

Official Preparation: N.F. V.

Compound Elixir of Pepsin and Rennin, 2 fl. dr. (8 cc.).

SEVUM PRÆPARATUM

(sē′vŭm prĕp′-ȧ-rā′tŭm)

PREPARED SUET—U.S.P.

Synonyms: Mutton Suet; Sevum.

Source: The abdomen of the sheep, Ovis aries Linné (Fam. Bovidæ).

Etymology: Sevum from the Lat. "sebum," *tallow* or *grease.*

Præparatum from the Lat. "præparare," from "præ," *before,* and "parare," *to make ready,* i.e., prepared.

Part Used: The internal fat of the abdomen, purified by melting and straining.

Description and Physical Properties: A white, solid fat, having, when fresh, a slight characteristic odor and a bland taste. It becomes rancid on prolonged exposure to the air and must not then be used.

Prepared Suet is insoluble in water and in cold alcohol. It is soluble in 45 parts of boiling alcohol, in about 60 parts of ether, and slowly dissolves in 2 parts of purified petroleum benzin. From its solution in the latter, when allowed to stand in a stoppered flask, it slowly separates in a crystalline form.

Discussion: Mutton suet is taken chiefly from the kidney region. It is first washed to free it from blood, then cut into pieces of suitable size, carefully melted and strained through muslin or flannel. It should be kept in a cool place in vessels impervious to fats or oils.

Constituents: About 30 per cent of mutton suet consists of olein, the remainder consisting of stearin and palmatin in varying proportions.

Properties and Uses: Mutton suet applied to the skin is soothing and emollient. Its principal use is as a base for cerates, ointments and plasters. It is used as a dressing for chapped hands, blisters and excoriated surfaces.

Official Preparation: U.S.P. X.

Stronger Mercurial Ointment.

LACTOSUM

(lăk-tō′sŭm)

LACTOSE—U.S.P.

Synonyms: Saccharum Lactis, U.S.P. IX; Milk Sugar.
Source: Cow's Milk.
Etymology: Lactosum, Lactose and Lactis from the Lat. "lac, lactis," *milk.*
Saccharum, the Lat. for *sugar.*
Part Used: The sugar (lactose) obtained from the whey of cow's milk.

Description and Physical Properties: White, hard, crystalline masses, or a white powder, producing a gritty sensation on the tongue. It is odorless, and has a faintly sweet taste. It is stable in the air, but readily absorbs odors.

On Gm. of Lactose is soluble in 4.9 cc. of water at 25° C., also in 2.6 cc. of boiling water. It is very slightly soluble in alcohol; insoluble in chloroform and in ether.

Discussion: This product is manufactured, for the most part, in the United States, Switzerland and the Bavarian Alps, where it is produced as a by-product of butter and cheese manufacture, being obtained from the whey. The milk is first treated for the recovery of the butter fat. Then it is acidulated, either by the addition of diluted hydrochloric or sulphuric acid or through the development of lactic acid through oxidation. The acid causes the casein to coagulate, whereupon it is removed and the resulting whey neutralized and reduced by evaporation to about 1/15 of its original volume. This product is placed in large vats or tubs and allowed to stand for a few days while the sugar crystallizes out in yellowish granules called "*sugar sand.*" Thin sticks or strings sometimes are placed in the liquid to facilitate the growth of the crystals. They are then dissolved in water, decolorized by charcoal, filtered and purified by recrystallization.

Properties and Uses: Milk sugar is less sweet than cane or beet sugar and less apt to undergo fermentation in the stomach or bowel. It is therefore employed as a nutrient in infant's food, certain forms of dyspepsia and in tuberculosis and other wasting diseases. Pharmaceutically it is employed as a medicinally inert diluent for other drugs in making powders and triturations. Here it aids in the comminution of other substances because of its hardness and gritty character.

Official Preparations: U.S.P. X.
Powder of Ipecac and Opium, 5 gr. (0.3 Gm.).
Triturations.

(*a*) SUPRARENALUM SICCUM

(sū′prȧ-rē′năl-ŭm sĭc′cŭm)

DRIED SUPRARENALS—U.S.P. IX

(*b*) EPINEPHRINA

(ĕp′ĭ-nef′-rĭ-nȧ)

EPINEPHRINE—U.S.P.

Synonyms: Laevo-Methylaminoethanolcatechol; Suprarenalin; Suprarenin; Adrenalin.

Source: The suprarenal glands of animals that are used for food by man.

Etymology: Suprarenalum from the Lat. "supra," *akin to*, "super," *over* or *above*, and "renalis," from "renes," *kidneys*, i.e., situated at the upper extremity of the kidneys.

Siccum from the Lat. "siccus," *dry*, from "siccare," *to dry*, i.e., dried.

Epinephrina from the Gr. "epi," *upon*, and "nephros," *kidney*.

Part Used: (*a*) The suprarenal glands freed from fat, and cleaned, dried and powdered, and containing not less than 0.4 per cent nor more than 0.6 per cent of epinephrine, the active principle of the suprarenal glands.

Description and Physical Properties: (*a*) A light yellowish-brown, amorphous powder, having a slight, characteristic odor; partially soluble in water.

(*b*) A white or light brownish, microcrystalline, odorless powder, gradually darkening on exposure to the air.

Epinephrine is very slightly soluble in water and in alcohol. It is insoluble in ether, chloroform, acetone, and in fixed or volatile oils.

Discussion: This gland drug is a light-yellowish-brown, amorphous powder having a slight, but characteristic odor, and is partly soluble in water. There has long been felt an uncertainty of knowledge concerning the physiological functions of the suprarenal glands. Consequently much research work has been done along this line and it is now thought that the glands possess two functions: (1) the destruction of certain poisons in the blood, and (2) the secretion of a substance which has a powerful stimulating effect upon the general circulation, acting both upon the heart itself and upon the muscular coat of the arterioles. The intravenous injection of the extract of the glands produces an enormous rise in the arterial pressure. This, however, is very transitory, probably on account of the rapid destruction of the active principle in the system.

Constituents: The active principle of the suprarenal glands was first isolated by Dr. Abel, of Johns Hopkins University, who named it "*epinephrin.*" Later it was obtained by Takamine, who called it "*adrenalin.*" Its formula is $C_9H_{13}O_3N$.

Properties and Uses: Suprarenal extract is claimed to have no effect on a normal heart, but if the heart's action be weak, rapid or irregular, it slows its rate, strengthens its contraction and regulates its beat. It is administered intravenously in cases of shock or sudden collapse due to cardiac weakness. Adrenalin, the active principle of the suprarenal glands, when applied locally, is astringent and hæmostatic and has the property of strongly contracting the arterioles. Accordingly it is used in connection with surgical operations to control bleeding. Thus it is especially valuable for this purpose in operations about the nose and throat, but is becoming quite generally used in all forms of minor surgery. On account of its astringent action and its property of contracting tissue, adrenalin is used about the nose and throat to relieve congestions and promote the absorption of inflammatory products, as in hay fever, rhinitis and hypertrophy of the turbinated bodies; also in epistaxis as a hæmostatic. After its astringent effects have worn off it leaves the blood vessels relaxed. For this reason it is necessary to guard against post-operative hemorrhages.

A solution of adrenalin hydrochloride (1 to 10,000 in water) is dropped into the eye for conjunctivitis, iritis, and keratitis, and into the ear for tinnitus and deafness resulting from local congestion. This solution will relieve the pain and congestion of conjunctivitis within a surprisingly short time.

The commercial solution of 1 to 1000 in hypodermic doses of from five to fifteen minims give spectacular relief in attacks of asthma.

Dose: (*a*) 4 gr. (0.25 Gm.)
(*b*) 1/120 gr. (0.0005 Gm.)

(*a*) THYROIDEUM
(thī′roi-dē′ŭm)

THYROID—U.S.P.

(*b*) THYROXINUM
(thī′rŏx-ĭn′ŭm)

THYROXIN—U.S.P.

Synonym: Thyroideum Siccum, U.S.P. IX.

Source: The thyroid glands of animals that are used for food by man.

Etymology: Thyroideum from the Gr. "thyreoeides," *shield-shaped*, from "thyreos," *a large, oblong shield*, from "thyra," *a door*, and "eidos," *form*, referring to the shape of the gland.

Part Used: (*a*) The thyroid glands, freed from fat and connective tissue, and cleaned, dried and powdered, and containing not less than 0.17 per cent nor more than 0.23 per cent of iodine in thyroid combination. The pharmacopœia directs that it must be free from iodine in inorganic or any other form of combination than that peculiar to the thyroid gland.

(*b*) An active principle obtained from the thyroid gland, and containing not less than 63 per cent of iodine.

Description and Physical Properties: (*a*) A yellowish, amorphous powder, having a slight, characteristic odor.

(*b*) White or slightly yellow, needle-like, odorless crystals or powder.

Thyroxin is insoluble in water and practically insoluble in alcohol or other usual organic solvents, but in the presence of mineral acids it dissolves in alcohol. It is soluble in solutions of the alkali hydroxides and when alkaline solutions are saturated with sodium chloride the sodium salt of thyroxin separates.

Discussion: Thyroid is a yellowish, amorphous powder, having a slight but peculiar odor. Thyroxin is a white or slightly yellow, needle-like, odorless powder or crystals. The surgical removal of the thyroid glands from animals results in the disease known as "*myxedema*" or "*cretinism*," hence the value of these drugs in these forms of disease. The value of these drugs also seems to be well established in that particular form of goiter which is endemic in several parts of the world, notably Switzerland, but they seem to do more harm than good in exophthalmic goiter. It is evident that the function of these glands has to do with the general nutrition of the body.

Constituents: (*a*) Thyroid: Thyroxin, $(C_8H_5ONI_3).C_2H_4COOH$.

Properties and Uses: That the products of the thyroid gland have to do with the general nutrition and metabolism is a well-known fact, but the manner of their action is not yet well understood. Since the removal, or the impairment by disease, of this gland tends to the development of myxedema or cretinism, it is only logical to suppose that its administration will be remedial in the event one has such a disease, and, indeed, such is the case. Thus it is used in myxedematous diseases, excessive obesity, dwarfism and in goiter, which is in itself a disease of the thyroid gland.

In health, thyroid extract induces circulatory changes and causes a loss of flesh, due to a disturbed metabolism. When persisted in for some time it will cause ill health and a sallow complexion. Excessive use causes dementia, acute mania, exophthalmic goiter, or even death.

Dose: (*a*) 1 gr. (0.06 Gm.)
(*b*) 1/120 gr. (0.0005 Gm.)

PITUITARIUM

(pĭ-tū′ĭ-tå′rĭ-ŭm)

PITUITARY—U.S.P.

Synonyms: Hypophysis Sicca U.S.P. IX; Desiccated Pituitary Body (Posterior lobe).

Source: The posterior lobe of the pituitary body of domesticated animals that are used for food by man.

Etymology: Pituitarium from the Lat. "pituita," *phlegm, pituite.* Named after the pituitary membrane lining the nasal cavities because it was thought to secrete the nasal mucus.

Part Used: The desiccated posterior lobe of the gland.

Description and Physical Properties: A yellowish or grayish amorphous powder, having a characteristic odor. It is only partially soluble in water.

Discussion: The pituitary gland, or "*body*," is a small, oval or bean-shaped, reddish-gray, vascular body attached to the infundibulum of the brain and occupies a depression in the middle line of the superior surface of the sphenoid bone. It is now classified as a ductless gland producing a secretion influencing metabolism in certain of the tissues and organs, especially that of the connective tissue and bone. The pituitary body is present in all craniate vertebrates, and consists of two parts or lobes. The anterior lobe arises from a diverticulum of the primitive oral cavity. In some species this diverticulum is represented by a large, tubular pouch connected with the nasal cavity. This fact gave rise to the belief that the body secreted the mucus of the nose. The posterior lobe arises as a downward growth of the floor of the thalamencephalon. The drug exists as a yellowish or grayish amorphous powder with characteristic odor.

Properties and Uses: Hypodermic injection of this gland causes a stimulation of all of the unstriped muscles of the body and increases the secretions of the kidneys and mammary glands. The importance of this action seems to be limited, thus far, to its effect on the circulatory, uterine and intestinal muscles, it being regarded as one of the most powerful and certain of the stimulants for the uterine muscle that we know. Its most common use at this time is that of a uterine stimulant during labor. It is more prompt in this action than ergot, with which it is frequently combined. As an intestinal stimulant it has been recommended for the treatment of post-operative paralysis of the bowel. While it markedly increases the secretion of milk when first administered, this primary stimulation seems to be followed by a compensatory diminution in glandular activity, resulting in a lessened secretion later on.

DOSE: ½ gr. (0.03 Gm.).

OFFICIAL PREPARATION: U.S.P. X.

Solution of Pituitary, 15 m. (1 cc.).

ANTITOXINUM DIPHTHERICUM

(ăn′tĭ-tŏk-sī′nŭm dĭf-thē′rĭ-cŭm)

DIPHTHERIA ANTITOXIN

SYNONYMS: Concentrated Diphtheria Antitoxin; Purified Antidiphtheric Serum; Refined Diphtheria Antitoxin.

SOURCE: The blood of an animal of the genus Equus (Ord. Equidæ).

ETYMOLOGY: Antitoxinum from the Gr. "anti," *against*, and "toxikon," *poison for smearing arrows*, from "toxikos," *of* or *for the bow*, from "toxon," *a bow*, i.e., counteracting poison.

Diphthericum from the Gr. "diphthera," *leather* (here used in the sense of *membrane*), referring, of course, to the false membrane which forms in the throat.

Equus, the Lat. for *horse*.

Caballus is an ancient Lat. form for *horse*. The Sp. is "caballo," and the Portuguese "cavallo."

PART USED: Diphtheria Antitoxin is an aqueous solution of certain antitoxic substances obtained from the blood serum or plasma of an animal of the genus Equus, which has been properly immunized against diphtheria toxin. After the serum or plasma from the immunized animal has been collected, the antitoxin-bearing globulins are separated from the other constituents of the serum or plasma and dissolved in water. Sodium chloride and a preservative are then added and the solution is filtered through a bacteria-excluding filter. It has a potency of not less than 350 antitoxin units per cc.

DESCRIPTION AND PHYSICAL PROPERTIES: A transparent or slightly opalescent liquid, with sometimes a slight granular deposit, of a faint brownish, yellowish or greenish color, nearly odorless, or having an odor due to the presence of the antiseptic used as a preservative. Diphtheria Antitoxin must come from healthy animals, must be sterile, free from toxins, and must not contain an excessive amount of preservative (not more than 0.5 per cent of phenol or 0.4 per cent of cresol, when either of these is used) and the total solids must not exceed 20 per cent.

Diphtheria Antitoxin must be prepared in an establishment licensed by the

Secretary of the Treasury of the United States. The requirements for labeling are that the outside label must bear the name Diphtheria Antitoxin and the minimum number of units in the package, the lot number of the antitoxin, the name, address and license number of the manufacturer, and a statement of the date beyond which the minimum potency may not be maintained. This date is one year from date of issue from the manufacturing establishment if an excess of 20 per cent over the minimum potency has been placed in the container, two years for a 30 per cent excess, three years for a 40 per cent excess, or four years for a 50 per cent excess.

DISCUSSION: The fact that the blood serum of animals which had been immunized against certain diseases, by inoculating the animal with the bacterial toxins of those diseases, possessed antitoxic properties, was discovered by Drs. Behring and Kitasato in 1890. In 1894 the practical therapeutic value of diphtheria antitoxin so prepared was demonstrated by Drs. Behring and Roux.

The horse is chosen as the animal to be used in the preparation of diphtheria antitoxin for several reasons. It is very susceptible to the diphtheria toxin; because of its size, the quantity of blood that may be drawn at one time without serious injury to the animal is relatively large, and horse serum is less objectionable to the patient than is that of other animals.

The horse, perfectly healthy and kept under the strictest sanitary conditions, is inoculated with increasing amounts of the toxin. At first only one-tenth of a cubic centimeter is injected. This causes local swelling and edema, together with fever and a derangement of the appetite. These symptoms disappear in a few days and the animal is again inoculated with a larger amount of the toxin. This treatment is continued with increasing doses until, after a few months, the animal is able to bear the injection of 500 or even 1000 cubic centimeters of a strong toxin.

Now, during this procedure an antitoxin is being constantly built up by a vital reaction of the cells of the body in response to the stimulation induced by the toxin, and at the end of from three to six months, each cubic centimeter of the blood of the horse contains from 200 to three or four times that number of units of the antitoxin. Blood is then drawn, under aseptic precautions, from the external jugular vein and collected in long, sterile cylinders in which it is allowed to separate. The clear serum, constituting the supernatant layer, is drawn off and a preservative added. This is the crude diphtheria antitoxin.

This crude antitoxin is purified to remove proteins, inert and objectionable associated products, filtered through a Berkefeld filter and tested for potency, purity and sterility. As found in the market, diphtheria antitoxin is generally contained in a sterile syringe accompanied with one or more sterile hypodermic needles and is ready for immediate use. Each package is labeled to show the number of units it contains. The "expiration date" or the date after which the product may not, without reasonable doubt, be expected to yield specific results, is also indicated.

An antitoxin unit is described as the least amount of diphtheria antitoxin that will save the life of a 200 Gm. Guinea pig that has been inoculated with ten times the minimum lethal dose of diphtheria toxin. The *toxin* used for inoculating the horse is made by growing a virulent culture of the diphtheria bacillus in suitable medium under favorable conditions. After from five to seven days this culture is filtered through a bacteria-excluding filter, the clear filtrate containing the toxin which has been elaborated by the growth and multiplication of the bacilli.

CONSTITUENTS: Pure antitoxin has never been isolated but is believed to be related to the globulins.

PROPERTIES AND USES: Antidiphtheric serum acts as a prophylactic agent against diphtherial infection. It will also cure diphtheria if properly administered even after the infection has started, but the earlier the treatment is begun, the more certain will be the cure. Since some persons react unfavorably to the injection of foreign serums, it is generally regarded as preferable to inject small amounts of a serum of high concentration rather than a large volume of a more attenuated serum. Since the measuring of the serum in its antidotal properties is reduced to almost an exact science, the matter of dose adjustment becomes relatively simple, and the amount of foreign serum necessary to inject may be reduced to the minimum necessary to carry the required number of units. The point of injection, of course, must be treated antiseptically and the serum injected from the specially devised syringe in which it is supplied, in order to reduce to a minimum the danger of introducing foreign bacteria.

DOSE: Immunizing dose for well persons, 1000 units.
Average curative dose, 10,000 units.

(*a*) ANTITOXINUM TETANICUM

(ăn′tĭ-tŏk-sī′nŭm tė-tăn′ĭk′ŭm)

TETANUS ANTITOXIN—U.S.P.

(*b*) ANTITOXINUM TETANICUM CRUDUM

(ăn′tĭ-tŏk-sī′nŭm tė-tăn′ĭk-ŭm kro͞od′ŭm)

CRUDE TETANUS ANTITOXIN—U.S.P.

SYNONYMS: (*a*) Purified or Refined Antitetanic Serum; Concentrated Tetanus Antitoxin; Antitetanic Globulins.

(*b*) Antitetanic Serum; Unconcentrated or Unrefined Tetanus Antitoxin.

Source: (*a*) The blood serum or plasma of an animal of the genus Equus, which has been properly immunized against tetanus toxin.

(*b*) The blood of an animal of the genus Equus, which has been properly immunized against tetanus toxin.

Etymology: Antitoxinum from the Gr. "anti," *against*, or *opposed to*, and the Lat. "toxicum," *poison* (originally a poison in which arrows were dipped), from the Gr. "toxikon," *poison*, from "toxon," *an arrow*.

Tetanicum from the Lat. "tetanicus," *suffering from tetanus*, from the Gr. "tetanos," *stretched*, from "teinein," *to stretch*, referring to the spasms caused by the disease.

Crudum from the Lat. "crudus," *raw, unrefined*.

Part Used: (*a*) An aqueous solution of antitoxin-bearing globulins separated from other constituents of the serum or plasma and having a potency of not less than 300 units per cc.

(*b*) A fluid separated from the blood of an animal and having a potency of not less than 150 units per cc.

Description and Physical Properties: (*a*) A transparent or slightly opalescent liquid, with sometimes a slight granular deposit, of a faint brownish, yellowish or greenish color, nearly odorless, or having an odor due to the presence of the antiseptic used as a preservative. Tetanus Antitoxin must come from healthy animals, must be sterile, free from toxins, and must not contain an excessive amount of preservative (not more than 0.5 per cent of phenol or 0.4 per cent of cresol, when either of these is used) and the total solids must not exceed 20 per cent.

Tetanus Antitoxin must be prepared in an establishment licensed by the Secretary of the Treasury of the United States. The requirements for labeling are that the outside label must bear the name *Tetanus Antitoxin* and the minimum number of units in the package, the lot number of the antitoxin, the name, address and license number of the manufacturer, and a statement of the date beyond which the minimum potency may not be maintained. This date is one year from date of issue from the manufacturing establishment if an excess of 20 per cent over the minimum potency has been placed in the container, two years for a 30 per cent excess, three years for a 40 per cent excess, or four years for a 50 per cent excess.

The strength shall be expressed in units of antitoxic power, and the unit shall be that of the standard Tetanus Antitoxin distributed by the Hygienic Laboratory of the United States Public Health Service.

Tetanus Antitoxin must be dispensed in the unopened glass containers in which it was placed by the manufacturing establishment, and it should be *preserved* at a temperature between 4.5° and 20° C., preferably at the lower limit.

(*b*) A yellowish, or yellowish-brown, transparent, or slightly turbid liquid with sometimes a slight, granular deposit, having the faint odor of horse serum or having an odor due to the presence of the antiseptic used as a preservative. Crude Tetanus Antitoxin must come from healthy animals, must be sterile, free from toxins, and must not contain an excessive amount of preservative (not more than 0.5 per cent of phenol or 0.4 per cent of cresol, when either of these is used) and the total solids must not exceed 20 per cent.

The requirements as to permits and supervision of manufacture apply to this product as well as to the purified antitoxin.

DISCUSSION: Tetanus antitoxin is prepared in essentially the same manner as diphtheria antitoxin except that prior to the injection of the tetanus toxin, the horse is given an injection of about 5000 units of tetanus antitoxin. This precaution is necessary since the horse may be infected with tetanus and his blood contain enough of the toxin to constitute a source of great danger.

The difference between crude tetanus antitoxin and the purified, refined, or concentrated antitoxin lies in the purification to which the former is subjected to produce the latter. The purified antitoxin is about twice as strong as the crude article.

MEDICINAL PROPERTIES AND USES: Tetanus antitoxin is most useful as a preventive of tetanus, a disease caused by the Bacillus tetani. It is much less effective as a curative agent after the disease has obtained a foothold. In this respect it differs greatly from diphtheria antitoxin, which is curative in a very large proportion of cases even when used after the presence of the disease has become apparent. The reasons why tetanus antitoxin is less effective therapeutically are: (*a*) That there is a greater affinity between tetanus toxin and nerve cells than between it and the antitoxin. Tested outside of the living organism, there is only about one-third the affinity between tetanus toxin and antitoxin that there is between diphtheria toxin and antitoxin. (*b*) In diphtheria, toxin and antitoxin circulate in the blood, whereas the toxin of tetanus ascends the axis cylinder while the antitoxin is in the circulation. Having no common medium, the antitoxin does not come in contact with the toxin and consequently cannot neutralize or counteract it. From this it is evident that to be of fairly certain value, tetanus antitoxin must be injected, preferably as a prophylactic or, if that cannot be, then as early after infection as possible. Its use after infection has set in is said to reduce the mortality about 20 per cent. The percentage of deaths increases with the time interval between infection and treatment.

DOSE: (*a*) Tetanus Antitoxin: Curative, 10,000 units.
Protective, 1500 units.
(*b*) Crude Tetanus Antitoxin: Same as above.

ANTIVENIN

(ăn′tĭ-vē′nĭn)

NEARCTIC CROTALIDÆ

Synonym: North American Anti-Snake-Bite Serum.

Source: The blood of the horse, Equus caballus Linné (Ord. Equidæ).

Etymology: Antivenin from the Gr. "anti," *against*, and the Lat. "venenum," *poison*, i.e., opposed to poison or venom.

Nearctic from the Gr. "neos," *new*, and "arktos," *bear*, i.e., pertaining to or situated under the northern constellation called the "Bear." The term as here employed signifies "*northern*."

Crotalidæ from the Gr. "krotalon," *rattle*, the rattlesnake family.

Part Used: Antivenin is a purified and concentrated serum globulin obtained from the blood of horses which have been highly immunized against the venom of the most poisonous North American species of serpents of the family Crotalidæ, and contains antibodies which neutralize the venoms of rattlesnakes, copperheads and water moccasins.

Description and Physical Properties: Antivenin has the appearance and general properties of a concentrated serum or antitoxin, but is specific in its action against the venoms of the North American species of snakes of the family Crotalidæ.

Discussion: Various species of rattlesnakes are found in nearly all parts of the United States, parts of southern Canada, Mexico, and as far south as Argentina. The species vary markedly in size and general appearance, but all may be recognized by the unique caudal appendage commonly called the "*rattle*."

The water moccasin is common to the swamps and sluggish waterways of South Carolina, Georgia, Florida, Alabama, Louisiana and portions of the adjoining states. Like the rattlesnake, the water moccasin belongs to the family of Pit Vipers which are distinguished by having a deep pit on each side of the head between the eye and the nostril.

The distribution of the copperhead is also quite extensive, ranging from southern Massachusetts to northern Florida and westward as far as Illinois and Oklahoma. The copperhead also belongs to the Pit Vipers.

The method of preparation of antivenin is much the same as that employed in the preparation of Tetanus and Diphtheria Antitoxins. The venom is extracted from the snakes, promptly desiccated, and kept in that condition until used. It is prepared for injection by dissolving it in a saline-glycerin solution under sterile conditions. It is then injected in variable amounts so as to reach the desired degree of concentration. Injections are made subcutaneously, beginning with doses which contain but a fraction of a milligram of venom, and gradually increasing until a dose about 1000 times as large as the initial dose can be given without producing symptoms of poisoning.

When the course of immunization has been completed, bleeding of the horse is done in the usual way and, after separation, the plasma of the blood is concentrated by the salting-out process as used in the preparation of diphtheria antitoxin. The potency of antivenin is determined by tests on pigeons and can be expressed in terms of the amount of venom which it will neutralize. The maximum amount of venom that 1 cc. of the serum will neutralize, as shown by tests on pigeons, is taken as the titre of the serum. Pigeon tests may be supplemented by similar tests on rabbits and white mice to show both the preventive and curative action. The usual tests for purity, sterility, and safety are applied, as in the case of other serums. In the tests for potency 1 cc. of the serum must neutralize at least two milligrams of the venom used in producing it, as tested on pigeons, mice and rabbits.

MEDICINAL PROPERTIES AND USES: Antivenin has the property of neutralizing the venom of rattlesnakes, water moccasins, and copperheads, and is indicated in the treatment of poisoning from bites by members of these species. As implied by the name, it is more or less specific in neutralizing the venom of North American serpents of the family Crotalidæ. This distinction is made because of the fact that the antivenin produced as a result of the inoculation of animals by the venom of the species named is not effective against a certain South American species of rattlesnake which has an entirely different type of venom; nor is it effective against the venom of the coral snake or that of other families.

DOSE: Antivenin (Nearctic Crotalidæ) is marketed in syringes containing 10 cc. of the serum. The dosage recommended is 10 cc. or the entire contents of one syringe, this to be repeated where severe symptoms are not promptly relieved, and in those cases where a large amount of venom is supposed to have been injected.

Note. The inclusion of this article on antivenin in this text has been made possible through the courtesy of the Antivenin Institute of America and the H. K. Mulford Company of Philadelphia, manufacturers of antivenin.

(*a*) ADEPS LANÆ

(ăd′ĕps lā′nē)

WOOL FAT—U.S.P.

(*b*) ADEPS LANÆ HYDROSUS

(ăd′ĕps lā′nē hȳ-drō′sŭs)

HYDROUS WOOL FAT—U.S.P.

SYNONYMS: (*a*) Anhydrous Lanolin; Refined Wool Fat.
(*b*) Lanolin; Hydrous Wool Fat.

SOURCE: The wool of the sheep, Ovis aries Linné (Fam. Bovidæ).

ETYMOLOGY: Adeps, the Lat. for *animal fat.*

Lanæ, genitive of the Lat. "lana," *wool.*

Hydrosus from the Gr. "hudor," *water,* i.e., hydrated or containing water.

Ovis, the Lat. for *sheep,* from the Gr. "ois," *a sheep,* Aries, the Lat. for *ram,* the male sheep.

PART USED: (*a*) The purified, anhydrous, fat-like substance obtained from the wool.

(*b*) The purified, fat-like substance containing from 25 to 30 per cent of water.

DESCRIPTION AND PHYSICAL PROPERTIES: (*a*) A brownish-yellow, tenacious unctuous mass, having not more than a slight odor.

Wool Fat is insoluble in water, but mixes without separation with about twice its weight of water. It is sparingly soluble in cold alcohol, more soluble in hot alcohol, and freely soluble in ether and in chloroform.

(*b*) A yellowish-white, or nearly white, ointment-like mass, having not more than a slight odor.

Hydrous Wool Fat is insoluble in water.

HABITAT: Domesticated in all suitable climates.

DISCUSSION: The sheep is one of the most useful of our domesticated animals. Its wool constitutes one of the most important of our textile fibers and supplies a large per cent of the clothing of man. The walls of the intestines are used as sausage casings. They also supply the so-called "*catgut*" strings for musical instruments. The pelts are used as robes and as lining for coats in many cold climates. The wool contains from 35 to 45 per cent of its weight of wool-fat. This is removed by benzin or other cheap volatile solvent, or by washing the wool in several waters whereupon the fat washes out and rises to the surface. It is collected, melted, strained through linen, purified and finally bleached in the sun or by chemicals. It is dehydrated by the use of calcium chloride and unslaked lime. When purified it is a pale-yellow, sticky, unctuous mass of characteristic odor and taste. It is insoluble in, but miscible with as much as twice its weight of water. In 1924, 1,111,267 pounds of wool fat were imported.

CONSTITUENTS: Wool fat consists of a number of principles, such as cholesterin, $C_{27}H_{45}.OH$, iso-cholesterin, $C_{26}H_{43}.OH$, and esters of lano-palmitic, stearic, capronic, isovaleric, butyric, carnaubic, oleic and myristic acids.

PROPERTIES AND USES: Wool fat is softening and soothing to the skin. It is absorbed more readily than any other known fat; therefore, it is used as a base for mercury and other medicines that are to be administered by inunction. Since it does not become rancid readily, it makes a good base for ointments and salves.

OFFICIAL PREPARATIONS: U.S.P. X.

Belladonna Ointment (wool fat).
Iodine Ointment (wool fat).
Iodoform Ointment (wool fat).
Chrysarobin Ointment (hydrous wool fat.)
Ointment of Ammoniated Mercury (hydrous wool fat).
Ointment of Yellow Mercuric Oxide (hydrous wool fat).

CHAPTER XC

THE VITAMINES

Dietitians for many years were of the opinion that a diet containing fats, proteins, carbohydrates and salts or mineral constituents in certain definite proportions constituted a complete and balanced ration and should therefore be sufficient to promote normal growth and well-being.

Recent investigations in nutrition have shown that the above constituents in a diet are not sufficient for growth and normal metabolism but that there are certain other factors essential to make the diet complete and adequate to meet the needs of growth and repair, maintain health, preserve life and permit reproduction.

In 1897 Eijkman made the observation that the disease beriberi was due to a physiologically inadequate diet of polished rice, but that when whole (unpolished) rice was consumed, beriberi did not ensue. He also discovered that when pigeons were fed with polished rice they developed a disease analogous to that of human beriberi. This beriberi in pigeons could be cured or prevented by feeding rice polishings.

In 1906 Hopkins made the observation that animals cannot live on a mixture of pure protein, fat, carbohydrate and inorganic salts. He realized that there were certain other substances necessary for adequate nutrition. He called these substances "accessory factors" of diet.

Funk gave the name "vitamine" to these essential food substances because he believed that they were of an amine nature. McCollum raised objections to the above two terms and differentiated the various food essentials as fat-soluble A and water-soluble B, because the former is always associated with fats and is soluble in them while the latter is soluble in water. Since that time other vitamines have been added to the list.

At the present time the term vitamine has been retained for these substances as a class, but the individual vitamines are designated as Fat-soluble A, Water-soluble B, etc.

Stepp, in 1909, did the first really progressive work on vitamines by animal experimentation. He was able to prepare alcoholic extracts of foods, which, when added to a diet of purified food substances (physiologically inadequate foods) induced growth. Stepp's work was followed by investigations by numerous scientists, all of whom contributed much toward the solution of this problem.

However, it is to McCollum and Davis, working at the Wisconsin Experiment Station and to Osborne and Mendel at Yale that credit is due for the discovery of the first vitamine, namely, oil-soluble vitamine A.

Little is known of the chemical nature of vitamines. The only way that they can be differentiated and their presence demonstrated is by feeding experiments upon animals. In other words they are known by the effects they produce. Vitamines are classified as follows:

FAT-SOLUBLE VITAMINES

Vitamine A. This vitamine was the first of this group of food factors to be discovered. This essential factor occurs in cod liver oil, yolk of eggs, butter, milk, fats of internal organs of animals and the leafy portions of green plants. While butter and eggs contain considerable amounts of this factor, cod liver oil is by far the richest source of fat-soluble A. One ounce of cod liver oil is roughly equivalent in vitamine A content to 6¼ pounds of the best creamery butter or 38 quarts of milk or 6 dozen of eggs.

Without fat-soluble A, growth will be retarded and emaciation will occur, accompanied by edema of the eyes, xerophthalmia and even blindness, if not checked in time. Recent work in England has shown that lack of this vitamine probably increases susceptibility to infections of the lungs and sinuses and may be the cause of mastoid troubles.

Vitamine D. This vitamine has received more attention in recent years than any of the others for the reason that there is great danger of a vitamine D deficiency in the diet of the infant and young child. McCollum and his co-workers first showed that a lack of vitamine D was responsible for the development of rickets. Hart and Steenbock showed that a very close relationship exists between vitamine D, sunlight (ultra-violet rays) and the proper and efficient utilization of calcium by the body in bone and tooth development and in milk and egg production. They have shown that not only do the young need this vitamine in abundance but that the mother likewise requires it to produce normal offspring of stamina and milk of high quality for their nourishment. Hess of New York, working independently of Hart and Steenbock, has demonstrated this same relationship in the human. He states:

> "Rickets is the most common nutritional disease occurring among children of the temperate zone; fully three-fourths of the infants in the great cities, such as New York, show rachitic signs in some degree."

He has stated that the human infant requires large amounts of vitamine D and that a daily dose of a teaspoonful of cod liver oil of high vitamine potency is essential to protect the infant from rickets. He further states that infants who have had rickets during the first winter of life are predisposed to develop this disease during the second winter and he therefore recommends that "cod liver oil be given not only during the first, but also during the second winter."

Cod liver oil is the only rich source of vitamine D known at this time. It is present in small amounts in milk, butter and eggs; but these foods do not contain enough of this essential food factor in a reasonable bulk for normal bone and tooth development in the growing child.

It is a common practice in many hospitals to give all infants a daily dose of cod liver oil. It may be started about the third month and, according to some authorities, should be continued through the second winter.

It is a common fallacy that all cod liver oils are equally rich in vitamines. The fact is that their vitamine content may vary as much as 500 per cent.

WATER-SOLUBLE VITAMINES

Vitamine B. This vitamine is thought by some investigators to consist of two vitamines, one of which will cure beriberi, the other of which is concerned with growth and probably with the prevention and cure of pellagra. The evidence for this division is not conclusive and many investigators believe still that they are one and the same entity. Vitamine B is essential to growth and well-being, and a deficiency of it will cause certain derangements in the nervous system resulting in beriberi.

Loss of appetite is also a result of a deficiency of this vitamine and some investigators believe that a lack of vitamine B interferes with digestion. That normal functioning of the digestive tract is dependent upon the presence of this vitamine as shown by the fact that a lack of it interferes with the peristaltic movement in the colon and results in constipation. Vitamine B is not stored by the body and must therefore be supplied continuously.

Vitamine B occurs in seeds, yeast, green plants, certain bulbs, fruits, milk, eggs and certain organs of the animal body.

Vitamine C. This is found in oranges, grapefruit, lemons, green vegetables, such as tomatoes, spinach and lettuce, in eggs and in raw milk. A deficiency of this vitamine causes disturbances leading to scurvy, a disease characterized by spongy gums, fetid breath, discolored patches of skin and frequently painful contraction of the muscles.

VITAMINE E. A fifth vitamine, designated as E, has been reported recently in the literature. It is claimed by some investigators to preside over iron assimilation. A lack of this vitamine is said to cause sterility; however, conclusive evidence of the existence of this vitamine is lacking at this time. It is not improbable that other vitamines will be discovered in the future.

The different vitamines vary to a considerable degree in their stability. Vitamine B is very stable and is not destroyed by the temperature of cooking. Vitamine C, on the other hand, is very unstable, being easily destroyed by heat. Vitamine A is quite stable to heat but is destroyed by oxidation. The United States Pharmacopœia X recognizes the vitamine-A value of cod liver oil and gives a method for its quantitative determination. The vitamine content is expressed in units. Vitamine D is determined by the "McCollum line test" or by the Steenbock test and the content of this vitamine also is expressed in units.

No definite methods of assay have been developed for Vitamines B and C at this time but fairly accurate comparisons have been made between different foods as to their relative vitamine B and C content.

CHAPTER XCI

INSULIN

Insulin is the active principle of the isles of Langerhans of the pancreas or stomach sweetbreads. When injected into an animal it produces a definite lowering of blood sugar or, in other words, burns a definite amount of carbohydrate in the body.

The discovery of insulin by Drs. Banting and Best at the University of Toronto was the outstanding achievement in medical science during the past decade. That the pancreas in some way controls carbohydrate metabolism and is concerned with diabetes was demonstrated in 1889 by the work of Von Merring and Minkowski, who produced fatal diabetes in dogs after complete removal of the pancreas. This work led to efforts by numerous investigators to obtain some beneficial effects in diabetes mellitus by feeding pancreas or by the administration of pancreatic extracts.

Murlin, Kleiner, Paulesco and others tried the effects of injections of aqueous extracts of the pancreas upon depancreatized dogs. They secured a transitory reduction in the blood sugar and in the sugar excreted in the urine. However, none of these extracts were of clinical value. The cause of failure in these early experiments was the presence in the extract of pancreatic enzymes which are destructive to the internal secretion that is active in carbohydrate metabolism.

Banting and his co-workers set out to make an extract free from enzymes. The first extracts were prepared from the islet tissue of the pancreas, then from extracts of pancreas of fetal calves and, finally, with the help of Dr. Collip, they were able to make an active, stable extract free of enzymes, from the pancreas of mature slaughter-house animals. These extracts were first injected into dogs whose pancreas had been removed. It was found that while dogs with the pancreas extirpated would die within a few days or a week, if given this pancreatic extract they would live for long periods of time. This work was followed by clinical trials on diabetic persons which demonstrated the great value of these extracts in the treatment of diabetes mellitus. Various improvements have been made from time to time in the method of preparation of insulin. The present method, in the main, consists of an acid alcoholic extraction of pancreatic glands and subsequent purification of the insulin by precipitation with various chemical agents and finally by repeated isoelectric precipitation.

The measure of the potency of insulin is the "unit." A unit is defined as "That amount of insulin which is equivalent to the amount of insulin which is contained in one-eighth of a milligram of the International Insulin Standard."

The unitage of insulin is determined by ascertaining the degree to which a sample of insulin will lower the blood sugar of a 2-kilogram rabbit. Rabbits weighing between 1800 and 2200 grams are starved for twenty-four hours. They are then bled and the normal blood sugar is determined. Varying amounts of insulin are then injected into groups of these rabbits. They are again bled at one and one-half, three- and five-hour intervals after the injections and the blood sugar is determined in each rabbit at these various periods. Taking into consideration the normal blood-sugar values and the values at the different periods after injection, together with the weight of the animal and the dose given, the number of units can be calculated by use of a formula which was developed at the University of Toronto. Because of normal variations in response to insulin by the individual animals, large numbers of rabbits must be used and the results averaged.

Insulin may be manufactured and marketed in this country only after issuance of license by the Insulin Committee of the University of Toronto. No insulin may be given away, used clinically, offered for sale or sold unless and until approved by the Insulin Committee as to purity, potency and stability.

This product is available in sterile vials, provided with a rubber cap of such construction that it can be pierced with a sterile hypodermic needle and the proper dose thus removed. The cap seals the vial hermetically and the needle punctures are self-sealing. Insulin is administered hypodermically only. No satisfactory oral preparation has as yet been offered.

Insulin is supplied to the medical profession in varying strengths, namely, 10, 20, 40, 50 and 80 units to the cubic centimeter.

While it is not necessary to store insulin in a refrigerator, it should be kept at moderate temperatures, as heat, even slightly above 125° F., causes notable loss of potency. Properly kept, it is permanent, and no expiration date need be indicated upon the label.

APPENDIX I

GLOSSARY OF MEDICAL TERMS

Abrasion. A superficial excoriation of the skin or mucous membrane by mechanical means, with loss of substance in the form of small shreds.

Abscess. A localized collection of pus in any part of the body, formed by disintegration and stretching of the tissues, usually due to an injury or bacterial infection.

Absorbent. A dressing, drug or medicine that causes an absorption of diseased tissues.

Addison's Disease. A morbid condition due to disease of the suprarenal capsules. It causes a peculiar brownish discoloration of the skin and is characterized by marked emaciation, progressive anemia and extreme asthenia. It is a chronic, usually fatal malady.

Adjuvant. A drug or medicine that assists in the action or operation of another drug or medicine.

Affection. A disease.

Agalactia. A lack of the proper secretion of milk following childbirth.

Analgesic. A drug or medicine that relieves pain.

Albuminuria. The presence of albumin in the urine. It is generally a symptom of disease of the kidneys.

Alopecia. Baldness, or loss of hair.

Alterative. A medicine or treatment that produces a gradual change in functional activity. Arsenic, iron, iodine, and the compounds of mercury, sodium and potassium are the most common alteratives.

Amaurosis. A loss or diminution of sight, without perceptible external change in the eye, due to a loss of power of the optic nerve, retina, spine or brain.

Amenorrhœa. Absence, diminution or stoppage of the menstrual discharge, from any cause other than pregnancy or the menopause.

Anemia. A deficiency in the blood or its constituents, occurring as a symptom or result of some disorder, or as a disease of obscure origin. There is a diminution in the number of red blood-corpuscles and of their hemoglobin content. The usual symptoms are pallor of the skin and mucous membranes, palpitation and general debility. Classified as simple and pernicious anemia.

Anaphrodisiac. A medicine or agent that allays sexual desire.

Anesthetic. (*a*) Local anesthetics reduce, or entirely obliterate local pain, by lessening the power of the nerves to receive or conduct sensations. (*b*) General anesthetics produce unconsciousness sufficiently complete to permit major surgical operations.

Anodyne. Any drug or medicine that allays pain; an opiate or narcotic.

Anthelmintic. A drug or medicine that expels or destroys intestinal worms.

Antiphlogistic. A medicine or diet that tends to check inflammation.

Antipyretic. A drug, medicine or agent that prevents or allays fever. A febrifuge.

Antiperiodic. A drug or medicine that prevents the return of periodically recurring symptoms, as of malarial fever.

Antirheumatic. A drug or medicine that relives or cures rheumatism.

Antiseptic. An agent that tends to prevent or arrest putrefaction, pus formation and other effects of the growth of bacteria by arresting the growth of the bacteria without necessarily killing them. This term is used especially to designate substances producing this result without exercising much toxic or irritating effect on the living body. An antiseptic is a substance that prevents the development and growth of disease germs; it is not a disinfectant unless it is capable of destroying disease germs in addition to preventing their growth.

Aperient. A mild laxative.

Aphrodisiac. An agent that stimulates sexual passion.

Aphthæ. An affection of the mouth, lips or gastro-intestinal tract in which roundish, pearl-colored specks or flakes occur.

Apoplexy. A sudden diminution or loss of consciousness, sensation and voluntary motion, usually caused by extravasation of blood or serum into the brain or spinal cord. Cerebral apoplexy is an effusion into the cerebral substance.

Ascaris. A genus of intestinal worms. Among those infecting the human body are the roundworm and the pinworm.

Asthma. A disease characterized by difficulty of breathing. It recurs at intervals and is accompanied with a wheezing sound, a sense of constriction in the chest, and expectoration.

Astringent. A substance which causes a drawing together or constriction of the tissues and arrests discharges.

Atonic. Relating to atony.

Atony. Lack of tone or vital energy; weakness of the system, or of any organ, especially a contractile organ.

Atrophy. A wasting away of the tissues for lack of nourishment; diminution in bulk or slow emaciation of the body or of any part of it.

Bilious. A term used to designate disorders supposed to arise from a too free secretion of bile.

Boil. Furuncle; a hard, painful, inflamed nodule which, on suppurating, discharges pus mixed with blood, and discloses a small, fibrous mass of dead tissue commonly called the "core."

Breakbone Fever or Dengue. A specific epidemic disease almost entirely confined to hot climates. It is attended with high fever, cutaneous eruption, and severe pains in the head and limbs. It is rarely fatal.

Bright's Disease. Any of several forms of disease of the kidney attended with albuminuria, including especially acute and chronic non-suppurative nephritis.

Bronchitis. Acute or chronic inflammation of the bronchial tubes or any part of them.

Buboes. An inflammatory swelling of a lymphatic gland, especially in the groin, due to the absorption of infective material, as in gonorrhea, syphilis, etc.

Cachectic. A condition characterized by malnutrition and general ill health, due to some chronic constitutional affection, as tuberculosis.

Cachexia. See Cachectic.

Calculi. Solid concretions formed abnormally in any part of the body, especially in the organs that act as reservoirs, and in the passages connected with them. Examples are (*a*) urinary calculi, found in the urine bladder or any part of the urinary passages; (*b*) renal calculi, found in the kidneys; (*c*) biliary calculi (gallstones), found in the gall bladder, biliary passages or sometimes within the liver.

Calmative. An agent that produces a sedative or calming effect.

Cancer. Carcinoma; a malignant tumor having its origin in the epithelial tissue and invading any of the surrounding structures.

Carbuncle. A painful, acute local inflammation of the subcutaneous tissue, especially of the trunk or back of the neck. Carbuncles differ from boils in their size, tendency to spread, and the severity of the symptoms, frequently producing death, especially when occurring in elderly persons, or those having diabetes. They are attended with chills, fever, and general malaise.

Cardiant. An agent which stimulates or increases the action of the heart.

Carminative. A calming or soothing medicine that acts by relieving pain caused by flatulence. They are used chiefly for children.

Catarrh. An inflammatory condition of a mucous membrane in which there is congestion, swelling and an alteration in the quantity and quality of the mucus secreted.

Cathartic. A medicine used to cause evacuation of the bowels; a purgative.

Chilblain. An inflammatory condition, frequently of the joints of the feet, caused by chilling, and characterized by swelling, itching and intense pain.

Chlorosis (Also known as "green sickness"). An anemic disease of girls about the age of puberty. Among the characteristic symptoms are a greenish or grayish-yellow hue of the skin, general weakness, impaired digestion, menstrual disorders, and palpitation.

Cholagogue. A medicine that promotes the discharge of bile.

Cholera. Any of several acute, infectious, very fatal, usually epidemic diseases of the alimentary tract, characterized by copious discharges of fluid materials from the bowel. It is caused by the spirillum of Asiatic cholera.

Cholera Infantum. An acute disease, often fatal, occurring among infants and young children during warm weather. It is characterized by gastric pain, purging, vomiting, fever, and prostration. The predisposing causes are the action of prolonged heat, together with errors in diet and sanitation.

Cholera Morbus. An acute catarrhal inflammation of the gastro-intestinal tract. It occurs during the heated period and is characterized by abdominal pain, purging, vomiting and spasmodic contractions of the muscles.

Chorea. A nervous disorder attended with convulsive twitchings of the muscles, or other involuntary movements. It is most common among children, especially girls. It is commonly known as "St. Vitus' dance."

Chronic. A term used to designate symptoms that continue indefinitely or for a long time. Not acute.

Colic. Severe, griping, acute pains in the bowel or adjacent organs. In intestinal colic there is usually distention of the bowel from gas produced from irritation from the intestinal contents.

Collapse. Extreme depression or prostration due to exhaustion, shock or wasting disease.

Condiment. Something used to give relish to food, especially a pungent, appetizing agent, as pepper or mustard; a seasoning; any spice.

Conjunctivitis. Inflammation of the conjunctiva, which is the delicate membrane lining the eyelids and covering the eyeball.

Constipation. A condition characterized by infrequent or difficult evacuation of the bowels.

Constringe. To draw together or cause to shrink; to constrict.

Convalescence. The period of restoration to health following a disease or ailment.

Convulsion. A violent, involuntary contraction of a muscle or set of muscles; a spasm or cramp.

Cordial. An invigorating or stimulating preparation, as a medicine or drink; an aromatic alcoholic liquor.

Corrigent. A corrective; a substance used to modify or make more agreeable the action of a remedy; used especially with purgatives to prevent griping.

Coryza. An acute inflammatory condition of the mucous lining of the nasal passages accompanied by discharges from the nostrils; cold in the head; nasal catarrh.

Costiveness. A condition characterized by infrequent or difficult evacuation of the bowels; constipation.

Counter-irritant. A substance used to produce superficial irritation (a blister, pustular eruption, or other milder form of irritation) at one point in order to relieve an existing irritation elsewhere. Iodine, mustard, cantharides and certain of the volatile oils are common examples.

Cretinism. A chronic condition of materially retarded or arrested mental and physical growth and development, exhibiting such characteristics as low stature, improperly nourished bones and other tissues and badly shaped bodies. A low degree of mentality or actual idiocy may obtain. The condition may be congenital. It appears to be a form of myxedema and probably results from deficient thyroid activity. It is endemic in parts of the Alps.

Croup. An affection of the larynx or trachea, accompanied by a hoarse cough and stridulous, difficult breathing. Sometimes this affection is accompanied by a false membrane in the air-passages and is then known as "membranous croup."

Cystitis. Inflammation of the bladder.

Delirium. A disturbance of the cerebral functions manifested by impaired action of the nerve centers and characterized by hallucinations, illusions, physical restlessness, incoherent speech, and staggering, uncertain gait.

Delirium Tremens. A violent form of insanity caused by excessive and prolonged use of intoxicating liquors. The victim experiences trembling, great excitement, anxiety and terrifying hallucinations of vision and hearing.

Delusional Insanity. Paranoia; an acute form of insanity marked by delusions.

Dementia. A mild form of insanity marked by imperfect conception and impaired perception. There is a partial loss of self-control and self-respect, will and memory.

Demulcent. A substance, usually of mucilaginous or oily nature, capable of soothing an inflamed or abraded mucous membrane, or protecting it from irritation.

Dental Caries. A decomposition of the enamel and dentin of a tooth, due to acid-producing bacteria.

Deobstruent. A medicine that removes or prevents functional obstructions of the body, as an aperient.

Diabetes. A disease characterized by persistent and excessive discharges of urine. There are two kinds: (*a*) Diabetes insipidus, in which there is an excessive flow of urine without abnormal constituents present and without excess of sugar, and (*b*) Diabetes mellitus, in which the blood and urine contain an excessive amount of sugar. This form is accompanied by excessive hunger and thirst and progressive emaciation. *See under* Insulin, page 526.

Diaphoretic. A drug, medicine or agent that causes increased perspiration.

Diarrhea. Abnormally frequent and profuse discharges from the bowel, but without tenesmus; a purging or looseness of the bowel.

Diphtheria. An acute, infectious, very contagious disease of the air-passages in which they, and especially the throat, become coated with patches or false membranes. The disease is caused by a specific micro-organism known as the Klebs-Löffler bacillus, *Corynebacterium diphtheriæ.*

Disinfectant. An agent that destroys disease germs or the noxious properties of fermentation and putrefaction.

Diuresis. An abnormal increase in the flow of urine.

Diuretic. An agent that increases the secretion of urine.

Dropsy. An abnormal accumulation of serous fluid in any of the cavities of the body, or in the subcutaneous cellular tissue.

Dysentery. A disease of the intestines, especially of the colon, in which inflammation or ulceration is present. It is characterized by griping pains and a constant desire to evacuate the bowels. The discharge contains mucus or blood. It may be acute or chronic, sporadic or epidemic. When epidemic it is often malignant.

Dysmenorrhœa. Difficult or painful menstruation.

Dyspepsia. Difficult, impaired or deranged digestion; an impaired or disordered condition of the stomach in which its normal functions are interfered with. The common manifestations are: loss of appetite, flatulence, nausea, acrid or fetid eructations and a sense of fullness in the stomach following meals.

Dyspnœa. Difficult, labored or painful breathing.

Dysuria. Difficult or painful discharge of the urine.

Ecbolic. A drug or medicine used to facilitate parturition or to produce abortion; an abortifacient.

Eczema. A disease of the skin, accompanied by inflammation, and characterized by redness and itching and the formation of papules, vesicles, pustules, scales or crusts. It is variously known as "tetter," "milk crust," or "salt rheum."

Edema. A swelling caused by the accumulation of watery fluids in the tissues or cavities in the body.

Embrocation. A lotion; an external application for the purpose of soothing and benefiting a diseased part.

Emetic. An agent used to produce vomiting.

Emmenagogue. An agent used to stimulate or promote the menstrual discharge.

Emollient. An agent used to soothe or soften the skin, especially for the purpose of relieving irritation or preventing chapping.

Emulsify. To convert into an emulsion, e.g., the pancreatic juice emulsifies the oily portion of the food, producing a milky fluid.

Encephalitis. An inflammation of the brain.

Endocarditis. An inflammation of the endocardium, which is the thin, epithelial membrane lining the cavities of the heart.

Enema. A liquid substance injected into the rectum either as a medicine or for the purpose of supplying nourishment; a clyster.

Enteritis. Inflammation of the intestines, principally the small intestines.

Enterolith. A concretion that forms within the intestinal tract; an intestinal calculus.

Epididymitis. An inflammation of the epididymis, which is an elongated mass at the back of the testicle composed chiefly of the greatly convoluted efferent tubes of that organ.

Epilepsy. The "falling sickness," so called because the patient falls suddenly to the ground; a chronic functional disease characterized by paroxysms or fits occurring at intervals. It is attended by a sudden loss of consciousness and convulsive movements of the muscles.

Epileptiform. Similar to the symptoms of epilepsy.

Epispastic. An agent which produces vesicles or blisters.

Epistaxis. Bleeding or hemorrhage from the nose.

Erysipelas. An acute, contagious, febrile disease accompanied by a diffused inflammation of the skin and mucous membranes. It is sometimes called " St. Anthony's Fire."

Erythema. An abnormal redness of the skin due to capillary congestion, as in inflammation.

Exanthematous. Pertaining to or characterized by an eruptive disease such as measles, smallpox, scarlatina, herpes, etc.

Excito-Motor. A drug or agent which excites activity of the motor centers.

Excoriate. To strip or wear off the skin; to abrade.

Exophthalmia. Abnormal protrusion of the eyeball.

Expectorant. A drug or medicine that facilitates or promotes the discharge, by spitting, of mucus from the throat, lungs or trachea.

False Croup. Catarrhal laryngitis; a disease of childhood characterized by sudden spasm of the larynx, labored inhalations and onset of cyanosis.

Favus. A contagious skin disease of man and other animals. It is caused by a parasitic fungus and occurs chiefly on the scalp, causing a loss of the hair.

Febrifuge. A remedy serving to mitigate or remove fever.

Fissured Nipples. A linear ulceration of the nipples during lactation. It results from improper care of the breasts.

Fistula. An abnormal opening or sinous ulcer frequently leading into a normal canal or organ, as into the rectum; an abnormal passage or canal between an internal cavity and another cavity or the surface, as a salivary fistula.

Flatulence. The presence of gases in the alimentary canal due to fermentation of the contents of the stomach or intestines.

Flatus. Gas in the stomach or intestine from fermentation of their contents.

Flux. A liquid discharge, often from the bowel, as the " bloody flux " of dysentery.

Fracture. The breaking of a bone, or (less often) a ligament.

Galactagogue. An agent that increases the secretion of milk.

Gallstones. Biliary calculi; the concretions sometimes found in the gall bladder or its ducts and sometimes in the liver. They are composed of the various components of the bile combined with cholesterin, magnesium or calcium. They are usually small, but may attain the size of a bird's egg.

Gangrene. Mortification of a part of the body from destruction, injury or failure in nutrition. It occurs in two forms: (*a*) Dry gangrene, which occurs in the superficial parts of the body, which remain dry by the evaporation of the fluids in the tissues affected. It is due to a defect in arterial supply and is usually caused by senile changes. (*b*) Moist gangrene, which usually occurs in deep-seated tissues where evaporation is impossible. It is caused by interference of arterial or venous circulation.

Gastralgia. Pain in the stomach, especially of neurotic origin.

Gastritis. Inflammation of the stomach.

Gastro-Enteritis. Inflammation of both the stomach and intestine.

Germicide. A substance or agent which destroys or kills micro-organisms.

Glaucoma. A disease of the eye characterized by intense intra-ocular pressure. There is a progressive impairment of vision and usually ultimate blindness.

Gleet. A chronic form of urethritis, following gonorrhea, with discharge.

Goiter. An enlarged condition of the thyroid gland. This disease is commonest in mountainous regions, especially in parts of Switzerland. It is often associated with cretinism and myxedema.

Gonorrhea. A specific infectious disease of the mucous membrane of the urethra or the vagina. It is caused by the gonococcus and is characterized by a muco-purulent discharge and with pain during urination.

Gout. A metabolic disease occurring in paroxysms and marked by a painful inflammation of the joints, deposits of sodium urate in and around the joints and an excessive amount of uric acid in the blood. It usually attacks first the great toe, after which other joints become involved.

Gravel. A deposit of small, calculous concretions, smaller than stones, in the kidneys or bladder.

Hay fever. An annually recurring disease of the mucous membrane of the nose and respiratory passages, also sometimes involving the conjunctiva. It is characterized by a marked catarrhal inflammation, coryza, and abundant lachrymation. There are frequently well-marked asthmatic attacks and considerable depression. It is believed to be caused by a protein of the pollen of a certain plant to which the individual is especially sensitive.

Hectic Fever. The febrile symptoms occurring daily in pulmonary tuberculosis and septic poisoning.

Hematuria. A discharge of bloody urine. It may be due to an injury, local disease, a general disorder or the presence of entozoa. When only the coloring matter of the blood is present in the urine, it is known as " hemoglobinuria."

Hemicrania. Neuralgia occurring on one side of the head only.

Hemoptysis. The expectoration of blood from the lungs. The blood is frothy and bright-red in color. It it be profuse, death may result.

Hemostatic. A medicine or agent which serves to arrest hemorrhage.

Hemorrhage. A copious discharge of blood from a blood vessel. It is called "a primary hemorrhage" when occurring at the time of injury; "a secondary hemorrhage" when some time has elapsed between the injury and the bleeding; "arterial hemorrhage" when from an artery; and "venous hemorrhage" when from a vein.

Hemorrhoids. A painful swelling at the margin of the anus, or within the same, formed by dilatation of a blood vessel, from which blood or mucus is occasionally discharged; piles.

Hepatitis. Inflammation of the liver.

Hernia. A protrusion of an organ, or part thereof, through some unnatural or accidental opening in the walls of the cavity confining the same. Hernia of the abdominal viscera is the most common and is known as a "rupture." Hernia of the brain, or of the lungs, also occur sometimes.

Herpes. Any of the various acute inflammatory affections of the skin or mucous membranes, characterized by the formation of clusters of small vesicles which have a tendency to spread from one part to another. One of the most common forms is herpes zoster, commonly known as "shingles," which is of nervous origin and is characterized by vesicles of the size of split peas, which occur in clusters and follow the course of a peripheral nerve. It sometimes spreads around the body, the inflamed areas being extremely tender and often itching greatly.

Hiccough. A spasmodic condition in which there is a sudden contraction of the diaphragm, accompanied by a closure of the glottis, the inrush of air against the closed glottis causing a peculiar sound. It sometimes lasts for hours or even days, and unless stopped, the patient will die from exhaustion.

Hydragogue. A medicine or agent which causes profuse watery discharges, especially from the bowels, as a hydragogue cathartic, or a hydragogue diuretic.

Hydrocele. A collection of fluid, especially in the scrotum. The term is also used to designate serous tumors in other locations.

Hyperasthenia. Extreme weakness.

Hypercatharsis. Excessive purging as the result of too free use of cathartics.

Hyperhidrosis. A functional disorder of the sweat glands marked by excessive perspiration.

Hypertrophy. The opposite of atrophy. A condition of morbid overgrowth or excessive development of an organ or part, such as may result from excessive indulgence in athletic exercise.

Hypnotic. A remedy used to produce sleep; a soporific.

Hypochondriasis. A mental disorder in which the patient is morbidly anxious concerning his health. It sometimes develops into melancholia.

Hysteria. A nervous affection, occurring most frequently in young women, in which the emotional and reflex excitability is exaggerated, and the will power correspondingly diminished, so that the patient loses control over the emotions and becomes the victim of imaginary sensations.

Ichthyosis. A disease characterized by a thickening of the skin which becomes rough and scaly; fishskin disease.

Incontinence. The inability of any of the organs to restrain the natural evacuations, so that the discharges are involuntary, as incontinence of the urine.

Indigestion. A failure on the part of the organs of digestion to properly perform their functions; incomplete or difficult digestion; dyspepsia.

Indolent Ulcer. An ulcer with an indurated, elevated margin and showing no disposition to heal. They occur most frequently on the leg.

Inertia. Inactivity; lack of force or initiative. Uterine inertia is a failure or sluggishness on the part of the womb to contract during labor.

Inflammation. A morbid condition resulting from irritation, consisting of swelling, congestion of blood and an exudation of serum and white blood corpuscles into the affected area.

Infection. A condition caused by the entrance of pathogenic microorganisms into the body or any part of it and their subsequent multiplication and elaboration of toxins.

Influenza. An epidemic or pandemic disease characterized by acute catarrhal inflammation of the nose, throat or bronchi, depression, nervous disturbances, and usually accompanied by fever, muscular prostration and severe neuralgic pains.

Insecticide. A drug or agent used for destroying insects; as insect powder.

Insomnia. Sleeplessness; abnormal wakefulness; prolonged inability to gain sufficient sleep.

Intermittent. Occurring at intervals. An intermittent fever occurs at more or less regular intervals of time.

Iritis. An inflammation of the iris of the eye.

Irritant. A drug or agent that causes irritation or inflammation to the part to which applied.

Jaundice. A diseased condition characterized by a yellow appearance of the skin, eyes, and urine, resulting from the presence of bile in the blood.

Keratitis. Inflammation of the cornea of the eye.

La Grippe. Influenza.

Laryngitis. Inflammation of the larynx accompanied by sore throat, horseness, and difficult or painful swallowing.

Leprosy. A chronic, infectious disease caused by a specific microorganism, the Bacillus lepræ.

Leucorrhœa. A discharge of white or yellowish, viscid mucus from the genital organs of the female. It is caused by an inflammation or congestion of the mucous membrane.

Lithemia. The presence of uric acid and urates in the blood, resulting from defective metabolism of the nitrogenous elements of the food.

Lithontriptic. A medicine or agent used for dissolving calculi.

Lochia. The discharge from the vagina, lasting a week or two following childbirth.

Locomotor Ataxia. Incoördination of muscular movements, especially in walking.

Lumbago. Pains in the loins and small of the back.

Lupus. A chronic disease of the skin and certain of the mucous membranes caused by the tubercle bacillus.

Malaria. A febrile disease caused by the presence of animal parasites in the red blood-corpuscles. *See under* Cinchona, page 439.

Mania. A form of insanity marked by great nervous excitement, delusions, hallucinations, and a tendency to commit acts of violence.

Mania-a-Potu. Mania caused by prolonged and excessive drinking of alcoholic liquors; delirium tremens.

Measles. A contagious, febrile disease, commencing with catarrhal symptoms, as conjunctivitis, coryza, and cough, and marked by the appearance on the third day of an eruption of distinct red circular spots, which coalesce in a concentric form, and after the fourth day of the eruption gradually decline.

Melancholia. A form of insanity in which there is great depression of spirit and gloominess, without adequate cause, the main idea being one of personal unworthiness. As the condition progresses, delusions and hallucinations appear, the patient showing suicidal tendencies. Many cases make a complete recovery, but others develop into mania or die of suicide.

Meningitis. Inflammation of the meninges, which are membranes covering the brain and spinal cord.

Menorrhagia. Excessive menstruation.

Menstruation. A periodic discharge of bloody fluid from the genital tract, occurring during the period of a woman's sexual activity, i.e., from puberty to the menopause.

Metritis. Inflammation of the uterus.

Metrorrhagia. An abnormal hemorrhage from the uterus independent of the menstrual discharge.

Migraine. A form of nervous or sick headache, usually recurring periodically and confined to one side of the head. Nausea and vomiting are common.

Monomania. A derangement of the mind as regards one subject or class of subjects only; also, popularly, such a concentration of interest in one subject as to suggest the existence of mental derangement.

Mumps. An acute, infectious disease, generally of childhood, in which there is a swelling of the parotid and other salivary glands. The left parotid is usually first infected. When the disease occurs at or during puberty there is often a metastasis to the testes, or to the ovaries or mammæ in the female. The disease is most common in males and in the spring of the year.

Myalgia. Pain in one or more muscles.

Mydriasis. A long-continued or excessive dilatation of the pupil of the eye.

Mydriatic. A medicine or agent that will dilate the pupil of the eye.

Myelitis. Inflammation of the bone marrow or spinal cord.

Myxedema. A disease resulting from failure or hypofunction of the thyroid gland. The face becomes cretinoid in appearance, the movements and speech slow and the intellect dulled.

Narcosis. The production of complete unconsciousness by the use of narcotic agents, as opium or the anesthetics.

Nasal Polypus. A result of hypertrophy or a kind of tumor, usually with a narrow base, occurring in the nose.

Nausea. A condition of the stomach in which there is a desire to vomit.

Nephritis. Inflammation of the kidney.

Nervine. A medicine or agent that calms and soothes nervous excitement, or one that is beneficial in nervous disorders.

Neuralgia. A very acute pain following the course of a nerve.

Night Sweats. Profuse sweating at night, or during sleep, usually accompanying tuberculosis or other wasting disease.

Nutrient. A substance that gives nourishment to the body.

Odontalgia. Toothache.

Ophthalmia. An inflammation of the membranes constituting the coats of the eyeball.

Orchitis. Inflammation of a testis.

Os Uteri. The opening of the uterus.

Otitis. Inflammation of the ear.

Otorrhœa. A purulent discharge from the ear.

Ovaritis. Inflammation of an ovary.

Ozena. An affection of the nose with offensive discharge resulting from rhinitis, syphilitic disease or caries.

Palpitation. An abnormal, rapid beating of the heart. It is often associated with a choking sensation in the throat and may be due to an organic or functional disorder of the heart or to indigestion.

Palsy. Paralysis.

Paralysis. A partial or complete loss of function or use of the voluntary muscles (motor paralysis), or of sensation (sensory paralysis).

Parasiticide. Any drug or agent used to destroy parasites.

Parotitis. Mumps; inflammation of the parotid gland or glands.

Paroxysm. An attack or manifestation of a symptom occurring at equal or unequal intervals; the sudden development or recurrence of the symptoms of a disease. Any sudden, violent, or uncontrollable action or emotion.

Parturient. Bringing forth; giving birth; about to bring forth young.

Parturition. The act of bringing forth the young or giving birth.

Pectoral. A medicine designed to give relief in disorders of the chest, as a cough remedy.

Pediculosis. A contagious animal parasitic skin disease characterized by the presence of lice; lousiness.

Pellagra. An erythematous skin and spinal affection or probably a nutritional deficiency disease accompanied by severe constitutional and nervous disorders. May result from a lack of vitamines in the diet.

Periadenitis. Inflammation of the cellular tissue about a gland.

Pericarditis. Inflammation of the pericardium.

Pericardium. The conical sac or serous membrane which incloses the heart.

Peristalsis. The peculiar wormlike wave motion of the alimentary canal, produced by successive contraction of the muscular fibers of their walls for the purpose of forcing their contents onward.

Peritonitis. Inflammation of the peritoneum, i.e., the serous membrane that lines the walls of the abdomen.

Pharyngitis. Inflammation of the pharynx.

Phlebitis. Inflammation of a vein.

Phthisis. Pulmonary tuberculosis; wasting of a part or the whole body.

Piles. The swellings or tumors known as "hemorrhoids," *which see.*

Pityriasis. A superficial skin disease, characterized by irregular patches of thin or bran-like scales. This term is used in veterinary practice to denote a disease among domestic animals characterized by dry, epithelial scales, due to digestive disturbances and alterations in the functions of the sebaceous glands.

Pleurisy. An inflammation of the pleura. It is usually accompanied by fever, painful or difficult breathing and cough, with exudation of serous fluid into the pleural cavity.

Pleuritis. Same as pleurisy.

Pneumonia. Inflammation of the lungs, usually due to infection.

Polypus. A sort of tumor found on mucous membranes, caused by hypertrophy of the mucous membrane. The majority of them are not true tumors, but inflammatory hyperplasias. They occur in the nose, bladder, uterus and rectum.

Post-Partum Hemorrhage. A hemorrhage following childbirth.

Poultice. A soft, moist application, made of bran, herbs, meal, etc., to be applied to sores, inflamed parts, bruises, etc., for the purpose of supplying heat and moisture. They soften the tissues and relieve pain.

Priapism. A morbid and more or less persistent erection of the penis, generally without sexual desire.

Prophylactic. A drug or medicine which serves to protect against a disease; a preventive.

Prostate Gland. The glandular body surrounding the neck of the bladder and beginning of the urethra in the male.

Protective. A drug, medicine or agent which serves to protect, defend or immunize against a disease.

Prurigo. A chronic inflammatory skin disorder characterized by a general eruption of small itching papules.

Pruritus. The itch; an itching.

Psora. The itch; scabies; psoriasis.

Ptyalism. Salivation; excessive flow of the saliva.

Puerperal. Of or pertaining to childbirth.

Puerperal Fever. An acute febrile condition accompanying childbirth and usually due to septic infection.

Pyelitis. Inflammation of the pelvis of the kidney.

Pyemia. A form of blood poisoning caused by the absorption of pyogenic micro-organisms into the blood, usually from a wound or local inflammation. It is characterized by abscesses occurring throughout the body, and is attended with chills, fever, jaundice, profuse sweating and exhaustion.

Pyrosis. A condition of the stomach in which there is a burning sensation with eructations of an acid fluid; heartburn; water brash.

Quinsy. Acute suppurative inflammation of the tonsils accompanied by swelling and painful swallowing.

Rash. A transient eruption on the skin, with little or no elevation.

Refrigerant. Allaying fever; a cooling drink.

Renal Colic. Severe pain produced by the passage of a calculus through the ureter.

Resolvent. A medicine which causes a tissue to dissolve or dissipate.

Rheumatism. A constitutional disease of various types or forms, characterized by pain or other symptoms. There may be no perceptible change in the parts affected, or the part may become greatly deformed. It attacks muscles, joints, or fibrous or serous membranes. The cause is obscure, but is ascribed to exposure, the presence of uric acid, lactic acid, micro-organisms, etc.

Rhinitis. Inflammation of the mucous membrane of the nostrils.

Rickets. A constitutional disease of childhood characterized by defective nutrition (due to lack of vitamines, especially of oil-soluble vitamine D), of the entire body and alterations in the growing bones. The cause seems to be a non-deposition of calcium in the bone tissue with consequent malformation; rachitis.

Ringworm. A contagious skin disease, found both in man and the domestic animals, due to a parasitic fungus. The growth and spread of the fungus causes circular or ring-shaped patches covered with vesicles or scales. It occurs on the body, the face or the scalp.

Roundworm. Ascaris lumbricoides, an intestinal parasite resembling the common earthworm, found in the small intestine.

Rubefacient. An external application causing a redness of the skin. Applied for the purpose of producing irritation or stimulation.

Scabies. A parasitic skin disease caused by the Sarcoptes scabiei, or "itch mite." The female mite burrows into the epidermis for the purpose of depositing her eggs, and irritates the skin, causing an inflammation and extreme itching. The mites show a preference for places where the skin is tender and soft, as between the fingers, on the flexor surfaces and on the wrists.

Scarlet Fever. Scarlatina; an acute, epidemic, contagious disease characterized by a scarlet-colored rash of the skin, spreading progressively from the face over the body. It is frequently complicated with other ailments, as disease of the kidneys, eyes, etc.

Sciatica. Inflammation of the great sciatic nerve. It occurs most commonly during middle life and may be confined to the proximal half of the thigh, or may follow the entire course of the nerve and its branches.

Scrofula. A morbid condition, usually constitutional, and frequently hereditary, now thought to be a manifestation of tuberculosis. It is characterized by glandular tumors, having a tendency to suppuration, and leaving indolent ulcers that are very difficult to heal.

Scrotum. The bag containing the testicles.

Scurvy. A nutritional disease occurring among those deprived of vegetable diet, due to a lack of vitamines. It quickly disappears under a proper diet.

Sedative. A medicine or agent that allays pain, excitement, activity, irritability, or irritation.

Seminal Emissions. Uncontrolled discharge of semen.

Septic. Capable of producing poisoning of the blood. A substance that promotes putrefaction.

Septicemia. Blood poisoning; a toxic condition of the blood caused by pathogenic micro-organisms. It is marked by chills, fever, great prostration and inflammation of the serous membranes and of the lungs, kidneys, and other organs.

Setons. Silk threads, linen threads or horse hairs introduced beneath the skin by a knife or needle for the purpose of forming an issue.

Sexual Impotence. A lack of power as applied to the male capacity for procreation.

Sialagogue. A drug or medicine that promotes the flow of saliva.

Siccative. An agent that promotes drying.

Smallpox. A contagious disease marked by peculiar eruptions which are at first merely papules, but become vesicles and then pustules, and finally thick, soft, yellow crusts which slough off, leaving a pit or scar.

Soporific. A drug or agent which induces sleep.

Spasm. Any unnatural, involuntary contraction of the muscles, or a condition in which the muscular fibers contract and relax alternately and quickly. In " tonic spasms " the contraction is steady and uniform. In " clonic spasms " the contractions alternate with periods of relaxation.

Speculum. An instrument for dilating certain cavities or passages of the body for the purpose of examination or treatment. Various forms of the instrument are made for the various passages of the body, as e.g., the ear, nose, etc.

Spermatorrhea. Abnormally frequent and involuntary emission of semen.

Spinal Irritation. Neurasthenia; a condition of nervous debility marked by depression of the vital forces, and usually caused by prolonged mental strain or overwork.

Sprain. A wrenching of a joint with tearing, laceration or other injury to a ligament.

Sterility. The state of being incapable of reproduction; infertility.

Sternutatory. A drug or agent that causes sneezing.

Stimulant. Any agent that excites or stimulates the organs of the body or some process of its economy.

Stomachic. A drug or medicine that stimulates the secretory and digestive functions of the stomach.

Stomatitis. Inflammation of the mucous membrane of the mouth.

Strangury. A spasmodic muscular contraction of the urethra and bladder resulting in painful discharge of urine.

Stricture. A local morbid constriction or contraction of a passage, as of the urethra or œsophagus.

Styptic. Astringent; a medicine or agent that constricts the blood-vessels and stops bleeding.

Sudorific. A medicine or agent that causes marked sweating; diaphoretic.

Summer Complaint. Cholera infantum.

Suppuration. The formation of pus; the process following an inflammation whereby the white blood-corpuscles or leucocytes, together with other cells, become pus and form an abscess.

Suppurative. A medicine or agent that causes suppuration.

Syphilis. A chronic, specific, venereal disease caused by the Spirochæta pallida or Treponema pallidum, characterized by various lesions of the tissues. Unless sooner cured, it runs a course of three stages: (*a*) primary syphilis, marked by a chancre or buboes; (*b*) secondary syphilis, marked by fever, mucous patches, eruptions of the skin, sore throat and general enlargement of the lymphatic glands; (*c*) tertiary syphilis, marked by gummata and severe lesions of the skin, bone, and other tissues.

Tæniafuge. Teniacide; a medicine or remedy used to expel tapeworm.

Tapeworm. Any of several species of parasitic worms inhabiting the alimentary tract of man or other animals and belonging to the genus Tænia or allied genera.

Tenesmus. Painful straining to effect evacuation of the bowels or bladder, without result.

Tetanus. Lockjaw; a painful and usually fatal infectious disease characterized by tonic spasms of some or all of the voluntary muscles. It is usually contracted by infection of a wound as the bite of a dog or cat infected with rabies and is due to the Tetanus bacillus.

Threadworm. Oxyuris; a long, slender, thread-like worm inhabiting the lower bowel; especially the pinworm, seatworm or other allied parasites of the family Ascaridæ.

Tinea Capitis. A generic term used to designate several kinds of skin diseases, caused by the presence of parasitic fungi, occurring in the scalp.

Tinnitus. Tinnitus aurium; a ringing, roaring or other purely subjective noise in the ear.

Tonic. A drug or medicine that promotes nutrition or tends to impart normal tone.

Tonsilitis. Inflammation of the tonsils. When acute and suppurative, it is called " quinsy."

Tormina. A griping pain in the bowels.

Torpid Liver. A sluggish functioning of the liver.

Torpor. Loss of motion or the power of motion; sluggishness.

Traumatic. Of or pertaining to a wound; due to a wound or injury.

Tuberculosis. An infectious disease, characterized by tubercules and caused by the tubercle bacillus. The most frequent seats of the disease are the lungs, the intestinal tract, the lymphatic glands, the serous membranes, the bones, the skin, the brain, the Fallopian tubes, the uterus and the spleen.

Tumor. A swelling; an abnormal mass of tissue arising without obvious cause from cells of preëxistent tissue, possessing no function and characteristically unrestrained in growth and structure.

Tympanites. A distention of the abdomen due to an accumulation of gas or air in the intestinal tract or peritoneal cavity.

Typhoid Fever. An infectious febrile disease caused by the introduction of the typhoid bacillus into the intestinal tract along with food or water. It is characterized by catarrh of the intestine, enlargement and necrosis of Peyer's glands, enlargement of the spleen and mesenteric glands and a peculiar eruption appearing on the seventh to ninth day and consisting of small, rose-colored spots, which disappear under pressure and come out again in successive crops. There is often a diarrhea, the discharges resembling pea soup in appearance.

Ulcer. A destructive loss of cutaneous substance, extending into the corium and causing gradual disintegration and necrosis of the tissue; a sore discharging pus; an open sore not the result of a wound.

Uraemia. Uremia; an accumulation in the blood of constituents which should have been eliminated by the urine, producing a toxic condition.

Urethritis. An inflammation of the urethra.

Urticaria. An inflammatory disease of the skin, marked by transient red pimples or by wheals surrounded by a red area. There is a burning or stinging sensation and intense itching. The cause may be due to the bite of an insect, or to puncture by certain plants, as the nettle, or it may be due to the ingestion of certain foods, as strawberries, etc.

Uterine Colic. Colic-like pains occurring at the menstrual periods and usually coming on in paroxysms.

Uvula. The fleshy lobe hanging from the soft palate in the middle of the posterior part of the mouth.

Variola. Smallpox.

Venereal condylomata. Lesions or patches in the skin or mucous membrane due to venereal disease, as syphilis.

Vermifuge. A drug or medicine capable of expelling intestinal worms.

Vertigo. A condition described as " dizziness, giddiness or swimming of the head "; an affection in which objects, though stationary, appear to move, and the patient finds it difficult to maintain an erect posture. This condition often precedes attacks of epilepsy or cerebral hemorrhage.

Vesical Catarrh. Cystitis; a catarrhal condition of the bladder or other similar organ.

Vesicant. An application designed to be applied to the skin for the purpose of causing vesication or blistering, as a mustard plaster.

Vulnerary. A medicine or application for cleansing or healing wounds.

Wart. A small, usually hard, tumor on the skin, formed by an enlargement of its vascular papillæ and a thickening of the epidermis covering them.

Whooping-cough. An infectious disease of childhood, characterized by violent, convulsive coughing which returns at irregular intervals, and consisting of several expirations followed by a sonorous inspiration known as the " whoop."

APPENDIX II

GLOSSARY OF BOTANICAL AND ZOOLOGICAL TERMS

Achene. Formerly called a "naked seed." A small, dry, one-seeded, indehiscent fruit with thin pericarp. Easily seen in the strawberry, where they are commonly called the "seeds."

Acuminate. Pointed or tapering at the end.

Alkaloid. A plant constituent, generally the physiologically active principle, consisting of carbon, hydrogen and nitrogen and sometimes oxygen. Alkaloids are bitter to the taste, poisonous, basic, and combine with acids without chemical replacement, forming salts.

Ament. A catkin; an inflorescence in the form of a bracted spike, usually deciduous when mature and bearing a number of unisexual, apetalous flowers. The willow, poplar, and chestnut (staminate) afford examples of this form of infloresence.

Anastamosis. A network of crossing and connecting vessels.

Anatropous. A situation in which the ovule of a seed becomes inverted at an early period in its development in such a manner that the chalaza is at the apparent apex.

Annual. Enduring for one season; recurring or returning each year or at yearly intervals.

Antenna. A feeler or horn; a movable organ of touch, frequently segmented and attached to the head.

Anther. That portion of the stamen containing the pollen; a pollen sac.

Aril (Arillus). An exterior covering, produced by a development of the funicle and forming a false coat or appendage to a seed.

Arillode. A false aril. It develops from the micropyle instead of from the funicle of the ovule, as in the true aril. The mace of the nutmeg is an arillode.

Awn. A bristle or beard of grain, as the wheat, barley, etc., or a fine, light, silky appendage attached to certain seeds to aid in their dispersion by the wind, as in the dandelion.

Axil. The angle formed by a leaf or branch with the stem from which it arises.

Axillary. Related to or arising from an axil.

Bast (Bast-Fiber). The inner fibrous portion of the bark of various plants.

Balsam. A liquid, semi-solid or solid substance obtained from plants, consisting of volatile oil and resin and containing either cinnamic or benzoic acid, or both.

Berry. A small, fleshy or pulpy fruit with seeds loosely imbedded in the pulp, e.g., the blueberry or blackberry.

Biennial. Existing or enduring for two seasons and then perishing, as a plant which forms its roots and leaves the first season, and produces fruit the second.

Bract. Bracts are more or less modified leaves of a plant surrounding a single flower or a cluster of flowers, e.g., the husks of corn or the red leaves of the poinsettia.

Calyx. The external, usually green or foliaceous, portion of a flower. Although the calyx is usually green, it may be colored similar to the corolla, or it may be even more showy than the corolla.

Cambium. A tissue in stems and roots which gives rise to new wood and bark.

Campanulate. Bell-shaped.

Campylotropous. Curved so that the apex and base come almost together.

Capitulum. Head; an inflorescence whose axis is contracted, giving rise to a flattened or rounded cluster of sessile flowers.

Capsule. An enclosed vessel containing seeds or spores.

Carpel. A modified leaf folded together to form a container or receptacle for the ovules.

Caruncle. A projection or excrescence from the seed coat adjoining or at the hilum of a seed.

Catkin. An ament; an inflorescence in the form of a bracted spike, usually deciduous when mature and bearing a number of unisexual, apetalous flowers, as in the willow, poplar or the staminate chestnut.

Chromatin. A granular material within the nucleus of cells which stains very deeply with certain dyes.

Chromogen. A substance capable of being changed into a coloring matter.

Chromosome. The elements of chromatin arranged in thread or rod-like masses.

Cilia. A fine, hair-like appendage possessing a lashing or vibratory motion.

Ciliate. Supplied with cilia or having the power of vibratory motion.

Commissure. The surface joining the two carpels of certain fruits, as in the fennel and rosemary.

Conchoidal. A broken surface exhibiting the wavy appearance of a half shell of a bivalve.

Coriaceous. Leathery; tough.

Corm. A compact, solid, fleshy, enlarged stem base, invested with thin membranes or scale leaves, and bearing buds. The crocus and gladiolus are examples.

Corolla. The petals of a flower taken collectively. The corolla is usually distinguished from the calyx by its color and the fineness of its texture.

Cortex. Bark; in roots and stems the portion exterior to the vascular system.

Corymb. Formerly any flat-topped or convex flower cluster. In later usage, a form of centripetal inflorescence in which the outermost flowers expand first.

Cotyledon. That portion of a seed which forms the first leaf, or pair of leaves (if it is dicotyledonous), developed by the embryo in seed plants.

Cremocarp. An umbelliferous fruit in which the two carpels are attached at their summits and which generally do not separate completely when mature.

Crenate. Scalloped; having the margin indented with teeth-like notches or scallops.

Cuneate. Wedge-shaped, with the point at the base.

Cylindraceous. Cylinder-like or resembling a cylinder in form.

Cyme. A form of determinate inflorescence, generally broad and flattened, in which the main axis ends in a single flower.

Decumbent. Lying on the ground, but with the apex or extremity raised. (See " procumbent " and " recumbent.")

Dehisce. To open, as a pod, along a suture or other definite line, for the purpose of discharging its contents (generally seeds).

Didymous. Twin; growing in pairs.

Disk Flower or **Disk Floret.** The small tubular flowers in the center or head, e.g., the daisy.

Dissepiment. A partition or separating tissue dividing the cells of a compound ovary. It is usually formed by the union of the adjacent walls of adjacent carpels, but occasionally occurs as an outgrowth from the wall of the ovary.

Dorsal. Back; rear; referring to a surface turned away from the axis or from the center of a flower.

Drupe. A fruit consisting of an exocarp which may be pulpy, soft or juicy, as the peach or olive, or tough, leathery, or fibrous, as in the almond. The endocarp consists of a hard stone enclosing the seed

Duct. A continuous tube consisting of lignified, elongated cells lying parallel and end to end, without intervening partitions.

Ellipsoidal. Resembling an ellipsoid; having an oblong shape.

Elytrum. A wing sheath or cover; one of the anterior pair of wings of certain insects, when serving only as a protection for the posterior pair of wings.

Emarginate. Having a notched margin, as a leaf or petal.

Embryo. A rudimentary plant contained in the seed before germination.

Endocarp. The inner layer of the pericarp of fruits when the latter consists of two or more layers of different tissue, as in the peach or apple.

Enzyme. A complex organic substance which, acting as a catalytic agent, is capable of effecting changes in other substances or compounds.

Exsert. To protrude or project beyond some encircling organ or part.

Exstipulate (Estipulate). Without a stipule, as a leaf.

Fascicle. A small collection, bundle, or cluster, as of fibers.

Ferment. An agent, such as yeast, or an enzyme, which is capable of causing fermentation.

Fibro-Vascular. Consisting of fibers; a bundle composed of strands of conducting tissue.

Filiform. Thread-like; having the form of a filament, i.e., very slender and long.

Floret. A small flower; one of the small flowers constituting the head or capitulum (usually called the "flower") of the compositæ, as the dandelion.

Follicle. A dry, one-celled fruit consisting of one carpel and dehiscing by but one suture.

Frond. An expansion in the shape of a leaf, but not differentiated as to stem and blade; the leaf of certain cryptogams.

Fruit. The edible product of a perennial or woody plant. The fruit consists of the seeds and their surrounding tissues, the latter being usually more or less succulent.

Fusiform. Spindle-shaped; thick in the middle and tapering toward each end.

Gamopetalous. A condition of the corolla in which the petals are united.

Glaucous. Covered with a whitish bloom, as in the grape and plum.

Glucoside. Glucosides are more or less complex organic compounds occurring in certain plants. They may be decomposed by the hydrolytic action of ferments, or by boiling with dilute acids or alkalies. When so decomposed they yield glucose, together with one or more other substances, usually cyclic compounds.

Gum. Any one of a number of amorphous, tasteless substances found in plants. They are obtained by natural exudation, or by incision of the plant to promote exudation, and subsequent hardening by exposure to the air. The chief constituents of gums are arabic acid, bassorin, etc.

Gum-resin. A natural combination of gum and resin existing in the plant as a milk juice. Gum-resins are usually obtained by incising the plant and allowing the juice which exudes to solidify by evaporation.

Gynœcium or **Gynecium.** The aggregate of pistils or of carpels in seed plants.

Herb. A plant the stem of which does not become woody and permanent, but dies, at least down to the ground, after flowering. Annual herbs live but one season while biennial herbs flower the second season and then die, and perennial herbs send up new stems year after year.

Herbaceous. Having the properties or characteristics of an herb.

Hermaphrodite. An animal or plant possessing both male and female reproductive organs, as a flower containing both stamens and pistil within the same calyx, or on the same receptacle.

Hilum. The mark or scar at the point of attachment of a seed to its funicle or base.

Hirsute. Having rough, stiff hairs.

Hypocotyl. The part of the stem inferior to the cotyledons in the embryo of seed plants; the primitive stem and root.

Indehiscent. Not dehiscing; remaining closed upon ripening.

Inflorescence. The flower or flowering part of a plant; a floral axis with its immediately associated parts with particular reference to their arrangement.

Involucre. A whorl, circle or rosette of bracts surrounding or supporting a flower cluster or head.

Keel. A ridge-like extension or process.

Labiate. Lipped; possessing lips; belonging to the family Labiatæ.

Lacticiferous. Lactiferous; carrying, conveying or secreting milk.

Lacuna. A small pit found on the surface of the thallus of lichens.

Lanceolate. Lance-shaped; frequently applied to leaves, narrow and tapering to a point at the apex.

Latex. A milky, whitish juice of varied consistence existing in certain plants.

Lenticel. One of the lens-shaped air pores in the bark of woody plants.

Lobe. A rounded section, division or part, as of a leaf.

Loculus. A cell of a compound ovary, or the cavity of a pollen sac.

Mandible. A jaw; as commonly used the term implies a jaw having a well-developed beak, as in birds and certain reptiles.

Median. Middle; in the middle or center.

Mericarp. One of the two carpels constituting the fruit (cremocarp) of umbelliferous plants.

Mycelium. A mass of interlacing hyphæ constituting the growing or vegetating portion of the thallus of fungi.

Oleoresin. A naturally occurring combination of oil and resin; a more or less liquid substance consisting of a resin dissolved or held in solution by a volatile oil.

Orbicular. Orbiculate; resembling an orb; spherical; circular.

Ovary. The principal female reproductive organ or gland. The ovum, or egg, is produced in the ovary.

Ovate. Egg-shaped; having a form similar to that of a longitudinal section of an egg.

Palmate. Hand-shaped; having lobes all radiating from one point like the outspread fingers of the hand. Formerly the term was applied only to leaves having five lobes, suggesting the palm of the hand. It is now employed irrespective of the number of lobes.

Panicle. A compound raceme; a raceme the branches of which are themselves racemes.

Papilla. A conical projection of an epithelial cell similar to a fine hair. Large numbers of them lend a velvet-like appearance to flower petals.

Papillose. Covered with papillæ; having epidermal cells whose walls form conical protuberances like small hairs.

Pappus. An appendage or tuft of appendages at the summit of a fruit or seed.

Parasite. Living in, on, or with some other plant or animal at the expense of the latter.

Parenchyma. A form of primary vegetable tissue constituting the bulk of the substance of leaves (not including the veins), pulp of fruit, pith of stems, etc., of plants. It is composed of thin-walled cells, rich in protoplasmic contents.

Pedicel. A slender stalk supporting a spore-bearing or fruiting organ; a stalk supporting a single flower.

Peduncle. The stem of a flower or inflorescence.

Pentamerous. A condition in which the floral whorl consists of five (or multiples of five) members. It is frequently written "5-merous."

Periderm. The outer bark; corticle tissue.

Perennial. Enduring from year to year.

Perianth. The floral leaves considered collectively, especially when these are not differentiated into a calyx and a corolla.

Pericarp. The outer, variously modified coverings of the ovary. It may be thin and membranaceous, as in many capsular fruits; hard and bony, as in the nuts; or fleshy and succulent, as in the berries.

Petal. One of the leaves of a flower which goes to form the corolla.

Petiole. A leafstalk; the stem of a leaf.

Pinnate. Feather-like; having parts arranged on opposite sides of an axis, as in compound leaves consisting of pairs of leaflets so situated on the axis that one of the pair is opposite its mate.

Pinnatifid. Cut or cleft into narrow lobes, none of the clefts extending to the midrib.

Pistil. An ovary and its appendages; generally consists of an ovary, style and stigma.

Pod. A dehiscent capsule, fruit or container bearing one or more seeds.

Pollen. Small fertilizing bodies or grains contained in the anther.

Procumbent. Prostrate; prone upon the ground; trailing. (See " decumbent " and " recumbent.")

Prothorax. In insects, the first segment of the thorax after the head. It carries the first pair of legs.

Protoplasm. The essential substance of all cells, whose physical and chemical properties are indispensable to all vital functions as nutrition, growth, and reproduction. Its exact composition is not known.

Pubescent. Hairy; downy; covered with minute soft hairs.

Punctate. Having minute spots or colored dots, depressions, or translucent internal glands.

Pyriform. Pear-shaped; having the form of a pear.

Pyxis. A pyxidium; a capsule which dehisces as if cut around the center so that the top drops off like a lid or cap.

Raceme. Resembling a spike, except that each flower is supported by a pedicel.

Rachis. The elongated axis of a spike or raceme.

Ray Flower. One of the outer circle of florets of composite flowers, as the dandelion or sunflower.

Recumbent. Bending over or lying on the ground. (See " decumbent " and " procumbent.")

Reniform. Kidney-shaped.

Resin. An amorphous vegetable substance, solid at ordinary temperatures, inflammable, fusible, saponifiable, insoluble in water, but mostly soluble in ether, chloroform or alcohol.

Reticulate. Resembling a net. A reticulated surface is one presenting the appearance of having a net drawn over it.

Revolute. Rolled or curved backward or downward from the margin or apex.

Ross. To separate or remove the periderm.

Sap. The fluid or juice of a plant; the aqueous fluid which circulates through the vascular tissues of plants; also the plant juices containing substances elaborated by the plant.

Saprophyte. An organism which lives on dead or decaying organic matter.

Sarcocarp. A pulpy or fleshy mesocarp as the pulpy portion of a plum or peach.

Scape. A naked peduncle rising at or beneath the ground.

Schizogenic. Formed by splitting or breaking down (dissolving) of neighboring cell walls.

Serrulate. Finely serrate; having a saw-like margin, as a leaf.

Sessile. Without a petiole, stalk or peduncle. A sessile leaf attaches directly to the stem of the plant without the intervention of a leaf-stalk or stem.

Sheath. A closely fitting covering or investment, as the blade of grass which serves as a sheath to the stem it surrounds.

Shrub. A low, woody plant frequently having several stems arising from the ground or a short distance above it.

Sinus. A cleft or depression between two lobes.

Spathe. A large enveloping bract or pair of bracts surrounding an inflorescence on a single axis.

Spatulate. Having the shape of a spatula or spoon; large and rounded above and gradually contracted toward the base.

Spheroidal. Having the form of a spheroid; a form resembling a sphere.

Spike. A sort of raceme whose flowers are sessile on the axis, as in the common plantain.

Stamen. The male organ or portion of a flower. It consists of an anther and filament.

Staminodium. A stamen that has been aborted, i.e., has become sterile.

Stigma. That portion (generally the apex or distal end) of the pistil which receives the pollen.

Stipe. A short support or stalk of a pistil; in ferns, the leaf-stalk.

Stipule. A membranous expansion or sheath enclosing the base of a leaf stem.

Striate (Striated).	Marked with minute grooves or channels. These often are parallel with one another.
Stolon.	A runner; a shoot from a plant which buds and takes root, giving rise to one or more new plants, as the runners of the strawberry.
Strigose.	Provided or covered with stiff bristles.
Style.	A filament above the ovary supporting the stigma.
Sub-cylindrical.	Imperfectly cylindrical.
Suberin.	A peculiar, fatty or waxy substance found in cork tissue.
Tap-root.	A primary root growing vertically into the ground.
Tomentose.	Woolly; covered with matted hairs.
Torus.	The receptacle; that portion of the axis of a flower which gives rise to the floral leaves.
Tree.	Generally a woody, perennial plant, 10 or more feet in height, consisting of a single stem without branches up to some considerable distance from the ground, above which it spreads out in numerous branches, which in turn, carry leaves, flowers, and fruits.
Tuber.	An enlarged, under-ground stem having scales or "eyes," as in the potato.
Tuberculated.	Having small excrescences or knob-like projections.
Umbel.	An inflorescence in which the pedicels appear to spring from one point producing a flattened or rounded flower head or cluster.
Vascular.	Of or pertaining to a system of vessels whose function is to convey some substance, as sap.
Vegetable.	Of or pertaining to plants. The distinction between vegetables and fruits is not well defined, but the courts have held that plants cultivated for human food and eaten during the principal part of a meal are vegetables, as potatoes, cabbage, beans, peas and tomatoes.
Ventral.	That portion or surface of a carpel or petal which faces toward the center of the flower.
Vitta.	An oil tube in umbelliferous fruits, as in anise, fennel, etc.

INDEX

A

Abies balsamea, 35
  canadensis, 43
  excelsa, 42
  Picea, 42
Absorbent cotton, 195, 196
Acacia, 342
  Senegal, 342
Accessory factors, 500, 522
Accessory food substances, 500
Acetone, 45, 46
Acetylcholine, 19
Acid acetic, 489
  benzoic, 77, 287, 333, 338, 362
  carminic, 491
  chrysophanic, 127, 129
  cinnamic, 77, 232, 233, 287, 362
  citric, 222, 319, 348, 479
  digallic, 105
  ferulic, 279
  formic, 279, 489
  fumaric, 180
  gallic, 105, 205, 285, 306
  gallotannic, 105
  hydrocyanic, 315, 316, 318
  igasuric, 376
  maizenic, 81
  malic, 279, 320, 479
  melonic, 177
  pyroligneous, 46
  tannic, 105, 106, 205, 238, 285, 302, 326, 357, 471
  tartaric, 348
  uric, 489
  valeric, 280
Aconine, 160
Aconite, 58, 160
Aconitine, 160
Aconitum, 160
  Napellus, 160
Acrid lettuce, 461
Acrinyl-sulpho-cyanide, 182
Adam's blanket, 410
Adeps, 500
  lanæ, 520
    hydrosus, 520
Adonidin, 168
Adonis, 167
  vernalis, 167
Adrenalin, 509, 510
  hydrochloride, 510
African chillies, 400
  ginger, 88
  pepper, 400
Agamatine, 19
Agar, 11
  Japanese, 11
Agar-agar, 11
Agaric, larch, purging, white, 19
Agaricin, 20
Agaricus, 19
Agropyron repens, 82
Ague tree, 140
  weed, 450
Aleppo wormseed, 456
Aletris, 65
  farinosa, 65
Alexandria wormseed, 456
Algæ, 9
Algin, 14
Alginic acid, 14
Allium, 64
  sativum, 64
Allspice, 296
Allyl-iso-sulpho-cyanide, 184
  -isothiocyanate, 184
Almond, bitter, oil, 315
  oil, expressed, 313
  sweet, Jordan, 313
Aloe, 51

Aloe, Cape, 51, 52
  Curaçao, 51, 52, 53
  ferox, 51
  Perryi, 51
Aloes, 51
  Socotrine, 51, 52
  vera, 51
Aloin, 53
Alpinia officinarum, 94
Alpinin, 95
Althæa, 192
  folia, 192
  officinalis, 192
Althea leaves, 192
Alum root, 204
Amber malt, 85
American calumba, 150
  hellebore, 58
  hemp, 384
  spikenard, 482
  storax, 286
  wormroot, 379
  valerian, 96
  wormseed, 130
Amido-succinamide, 194
Amygdala amara, 315
  dulcis, 313
Amygdalin, 312, 316, 318
Amygdalus communis, 315
Amylase, 505
Amylopsin, 504, 505
Amylum, 80
Anacardiaceæ, 236
Anacyclus Pyrethrum, 453
Anamirta cocculus, 152
Anemone camphor, 169
Anemonin, 169
Anethol, 273, 275
Angelic acid, 260, 280
Angelica archangelica, 281
  fruit, root, seed, 281
  fructus, 281
  radix, 281
Angiosperms, 28, 49
Animal drugs, 488
Anise, 272
  fruit, 272
  oil, 272
  seed, 272
  star, 272
Anisic acid, 275
Anisum, 272
Anthemic acid, 455
Anthemis, 454
  nobilis, 454
Anthranilic acid methyl ester, 227
Antidiphtheric serum, purified, 513
Antimalarial (quinine), 439
Antirachitic vitamine D, 523
Antiscorbutic vitamine C, 524
Antitetanic globulins, 515
  serum, purified, concentrated, refined, 515
Antitoxin, requirements to manufacture, 513, 516
Antitoxinum diphthericum, 513
  tetanicum, 515
    crudum, 515
Antitoxin unit, 515
Antivenin, 518
Antivenin Institute of America, 519
  potency, 519
Antixerophthalmic vitamine A, 523
Apii fructus, 282
Apis mellifera, 492
Apium graveolens, 282
Apoatropine, 395
Apocynaceæ, 382
Apocynamarin, 385
Apocynum, 384
  cannabinum, 385
Apomorphine, 177
Apple juice, fresh, 320
Apple of Sodom, 103, 402
Arabates, 343
Arabic acid, 343
Arabin, 343
Araceæ, 486
Aralia, 482
  racemosa, 482
Araliaceæ, 482
Arbor vitæ, 48
Arbutin, 357, 358
Archangel root, 281
Arctium Lappa, minus, 465
Arctostaphylos Uva-ursi, 356
Aristolochiaceæ, 351
Aristolochia reticulata, 351
  Serpentaria, 351
Aristolochine, 352

Arnica, 457
  montana, 457
Arnicin, 458
Aromadendrin, 291
Arrak, 76
Artemesia pauciflora, 456
Artemesin, 457
Arum Family, 486
Asafetida, 278
  gum, 278
Asafœtida, 278
Asarin, 353
Asarum, 352
  canadense, 352
Ascaridol, 130, 131
Ascaris lumbricoides, 131, 457
Asclepiadaceæ, 469
Asclepiadin, 470
Asclepias, 469
  tuberosa, 469
Ascomycetes, 15
Aselline, 499
Asparagin, 194, 324
Aspidium, 25
Asthma, 510
  weed, 426
Astragalus, 328
  gummifer, 328
Atropa Belladonna, 393
Atropine, 395, 397
Atropurpurin, 251
Attar of rose, 306
Aurantiamaric acid, 225
Aurantiamarin, 225
Aurantii amari cortex, 224
  dulcis cortex, 226
Aurantiin, 225
Auricular fibrillation, 409
  flutter, 409
Australian fever tree, 288
  kino, 290
Ava, 123
Avena sativa, 83
Avenin, 84
Awa, 123

B

Bachelor buttons, 374
Bacteria, 15
Balm Gilead, 35, 201
Balsam, black, 330
  fir, 35
  Indian, 330
  Peru, 330
  Poplar buds, 201
  Tolu, 332
Balsamum Peruvianum, 330
Band-briar, 402
Banewort, 393
Bannal, 335
Baptisia, 346
  tinctoria, 346
Baptisin, 347
Baptitoxin, 347
Barberry Family, 144
Barley malt, 84
Barosma betulina, 215
  camphor, 216
  crenulata, 215
  serratifolia, 215
Barren myrtle, 356
Basidiomycetes, 15
Basket fern, 25
Bassorin, 330
Bastard teak, 333
Bayberry, bark, tallow, 476
  Family, 476
Bay oil, 299
Bearberry, 356
Bear's paw root, 25
Bear's weed, 391
Beaumont root, 405
Bebirine, 152
Beech Family, 102
Beeswax, white, yellow, 492
Beggar's buttons, 465
Belladonna, 398
  folia, 393
  leaves, 393
  root, 393
Belladonine, 395
Benne oil, 268
Benzaldehyde, 312, 315, 316, 318
Benzoin, 361
  gum, 361
  Siam, 361
  Sumatra, 361
Benzoyl-aconine, 160, 213
Benzyl alcohol, 332
Benzyl benzoate, 332

Berbamine, 145
Berberidaceæ, 144
Berberine, 145, 150, 164, 167, 219
Berberis, 144
Bergamot oil, 227
Berry alder, 254
Beta vulgaris, 85
Bethroot, 66
Betula alba, 107
Betulaceæ, 107
Bhang, 111
Bibirine, 152
Bile salts, 506
Birch Family, 107
  tar, 107
Bird pepper, 400
Bird's eye, 167
Birth root, 66
Birthwort, 351
  Family, 351
Bitter apple, 428
  ash, 231
  cucumber, 428
  gourd, 428
  root, 370
  stem, 371
  sweet, 401
  wintergreen, 357
  wood, 231
Bitterwort, 370
Blackberry, 309
Black chokecherry, 311
  cohosh, 165
  dogwood, 254
  grain (cochineal), 491
  haw, 445
  Indian hemp, 111, 384
  malt, 85
  pepper, 119
  pitch, 46
  poppy, 175
  root, 405
  snakeroot, 165
  wood, 336
Bladder pod, 426
  wrack, 13
Blanket-leaf, 410
Blastophaga grossorum, 110
Blazing star, 63, 65
Blistering beetles, 488
Blistering flies, 488
Bloodroot, 172
Bloodwort, 172, 372
Blowball, 459
Blue cohosh, 147
  flag, 70
  gum tree, 288
  pimpernel, 424
  rocket, 160
  scullcap, 424
Boldine, 171
Boldo leaves, 170
Boldus, 170
Boldus Boldo, 170
Boll (cotton), 196
Boneset, 450
Borneol, 353, 419, 421
Bornyl acetate, 41, 419
Bos taurus, 504, 505, 506
Botanical names, 4
Bowman's root, 384, 405
Bramble-berry, 309
Brassica juncea, 183
Brassica nigra, 183
Brandy mint, 413
Brauneria, pallida, angustifolia, 467
Brayera, 310
Brazilian cocoa, 239
Broad-leaved gum plant, 451
Bromine, 499
Broom, Scotch, 335
Brown mint, 416
Brucine, 376, 381
Brunfelsia Hopeana, 403
Bryonia, 150
  alba, dioica, 432
Bryonidin, 432
Bryonin, 432
Bryony, 432
Bryophytes, 7, 24
Bucco, 215
Buchu, 215
  long, short, 215
Buckthorn, 254
  alder, 254
  berries, 255
  Family, 252
Bucku, 215
Buckwheat Family, 125
Bugbane, 58, 165

Bugwort, 165
Buku, 215
Bull-nettle, 402
Burdock root, 465
Burgundy pitch, 42
Burning bush, 250
Burseraceæ, 234
Butterfly weed, 469
Butternut bark, 472

C

Cabinet cherry, 311
Cacao, 243
  butter, 187
  præparata, 187
Cactaceæ, 474
Cactus Family, 474
Cactus grandiflorus, 474
Cactus sweet-scented, 474
  vanilla, 474
Cade oil, 45
Cadinene, 39, 40, 46
Caffeine, 189, 190, 240, 242, 243, 244
Caffeol, 443
Cajuput oil, 295
Calabar bean, 326
Calabarine, 328
Calamus Draco, 77
Calcium utilization, 500
Calendula, 458
  officinalis, 458
Calendulin, 459
California barberry, 144
  gum plant, 451
Calisaya bark, 436
Caltrop Family, 229
Calumba, 149
Calumbic acid, 150
Calumbin, 150
Calumbo, 149
Cambogia, 185
Campechy wood, 336
Camphor, 137
Camphora, 137
Camphor, Formosa, 137
  Japanese, 137
Canada snakeroot, 352
  balsam, 35
  turpentine, 35, 33
Canadian hemp, 384
Canadine, 164
Candle berry, 476
Canella, 142
Canellaceæ, 142
Canella Family, 142
  winterana, 142
Cannabin, 113
Cannabine, 114
Cannabis, 111
  Indica, 111
  sativa, 111
Canker root, 166
Cankerwort, 459
Cantharidin, 489
Cantharis, 488
  vesicatoria, 488
Caoutchouc, 260
Caprification, 110
Caprifoliaceæ, 444
Capronic acid, 521
Capsaicin, 400
Capsicine, 400
Capsicum, 400
  frutescens, 400
Caraway, 270
  fruit, 270
  oil, 270
  seed, 270
Carbo ligni, 202
Cardamom, Ceylon, 91
  fruit, 91
  Malabar, 91
  seed, 91
Cardamomi semen, 91
Carminic acid, 491
Carnaubic acid, 521
Carrageen, 10
Carrot Family, 270
Carthaginian apple, 300
Carum, 270
Carum carvi, 270
Carvacrol, 421
Carvone, 271, 417
Caryophylline, 297
Caryophyllus, 291
  aromaticus, 291
Cascara, 252
Cascara amarga, 233
Cascara sagrada, 252

Cascarin, 253
Casein, 504
Cassia angustifolia, 339
Cassia fistula, 337
  Senna, 339
Castanea, 105
  dentata, 105
Castor oil, 257
Cataria, 425
Catechin, 441
Catechu, pale, 440
  red, 441
Catechu-tannic acid, 441
"Catgut" strings, 520
Catmint, 425
Catnep, 425
Catnip, 425
Cathartic acid, 340
Cathartocarpus Fistula, 337
Caulifloræ, 188
Caulophyllin, 147
Caulophyllum, 147
  thalictroides, 147
Cayenne pepper, 400
Cedar, 30
  feather-leaf, 48
  white, 48
Celery fruit, 282
  seed, 282
Celestraceæ, 250
Cellulose, 330
Centaurium, 372
Centaury, 372
Cephaëlic acid, 435
Cephaëline, 435
Cephaëlis Ipecacuanha, 433
  acuminata, 433
Cera alba, 492
  flava, 492
Cerebrin, 502
Cereus, night-blooming, 474
Cerevisiæ fermentum compressum, 16
Cerolein, 493
Cerotic acid, 493
Cetaceum, 497
Cetin, 498
Cetraria, 22
  islandica, 22
Cetraric acid, 22
Cetrarin, 22
Cetyl alcohol, 498
  palmitate, 498
Cevadine, 58
Chamomile, garden, 454
  Roman, 454
  German, 485
  wild, 485
Chamælirin, 63
Chamælirium luteum, 63
Charcoal, wood, 202
Chaulmoogra oil, 245
Chaulmoogric acid, 246
Chavicol, 299
Cheese bowl, 174
Cheese-cake plant, 19
Chelerythrine, 173
Chenopodiaceæ, 130
Chenopodium ambrosioides var. anthelminticum, 130
Cherry, black choke, cabinet, rum, wild, wild black, 311
Chestnut leaves, 105
Chimaphila, 357
  umbellata, 357
Chimaphillin, 358
China bark, 317
  oil, 330
  root, 94
Chinese gelatin, 11
  ginger, 94
  musk, 496
Chinoidine, 439
Chionanthus, 368
  virginica, 368
Chirata, 371
Chiratin, 372
Chiretta, 371, 373
Chlorine, 499
Chlorophyceæ, 9
Chocolate, bitter, milk, "soluble," sweet, 189
  tree, 187
Cholesterin, 496, 502, 521
Choline, 113, 114
Chondodendron tomentosum, 151
Chondrus, 10
Chop-nut, 326
Christ's ladder, 372
Chrysarobin, 253, 345
Chrysarobinum, 345

Chrysophanic acid, 253, 340
Churrus, 111
Cibus deorum, 278
Cider, sweet, 320
Cimicifuga racemosa, 165
Cimicifugin, 165
Cinchona calisaya, Ledgeriana, red, succirubra, yellow, 436
Cinchonidine, 439
Cinchonine, 439
Cinchotannic acid, 439
Cineol, 289, 296, 297, 419
Cinnamein, 331
Cinnamic acid, 137
Cinnamon, Ceylon, 134
Cinnamomum, 134
  Camphora, 137
  cassia, 137
  Loureirii, 134
  zeylanicum, 134
Cinnamon wood, 140
Cinnamyl benzoate, 331
Citral, 223, 225, 299
Citronellal, 223, 225, 308
Citrullus Colocynthis, 428
Citrus Aurantium, 224
  var. sinensis, 226
  var. Bergamia, 227
Citrus medica var. Limonum, 221
Claviceps purpurea, 16
Clove, oil, 291
  pepper, 296
Cloves, Molucca, Penang, So. American, Sumatra, 294
Club mosses, 24
Coca, 212
Coca Family, 212
Cocaine, 213
Coca leaves, 212
Cocales, 213
Cocculus, 152
Cocculus indicus, 152
Cochin ginger, 88
Cochineal, 490
Cocillana, 206
Cockspur pepper, 400
  rye, 16
Coco, 75
Cocoa, 187, 189
  butter, 187
Coconut, 75
Coconut oil cake 77
Cocos nucifera, 75
Coccus, 490
  cacti, 490
Codamine, 177
Codeine, 177
Cod liver oil, 498
Cod oil, 498
Coffea arabica, liberica, 442
  tosta, 442
Coffee, Brazilian, Java, Liberian, Mocha, Rio, 443
  roasted, 442
Cola, 190
  Family, 187
  nitida, 190
Colchiceine, 57
Colchici cormus, 56
Colchicine, 57
Colchici semen, 56
Colchicum autumnale, 56
  corm, 56, 57
  seed, 56
Colic root, 65, 73
Colocynth, 428
  apple, fruit, 428
  Mogador, Turkish, 429
Colocynthin, 429
Colocynthitin, 429
Colocynthis, 428
Colombo, 149
Colophonium Group, 31, 41
Colophony, 41
Coltsfoot, 462
Columba, 149
Commiphora Myrrha, 234
Compositæ, 450
Composite Family, 450
Compressed yeast, 16
Condurangin, 471
Condurango, 470
Conhydrine, 276
Coniferæ, 29, 30
Coniferin, 47, 101
Coniferyl alcohol, 101
Coniine, 276
Conium, 275
  maculatum, 275
Consumptive's weed, 391

Convallarin, 61
Convallamarin, 61
Convallaria majalis, 60
  radix, 60
  root, 60
Convolvulaceæ, 386
Convolvulin, 388
Convolvulus Scammonia, 389
Copaiba, 79
  balsam, 341
  African, Bahia, Cartagena, Cayenne, Maracaibo, Maranham, Para, Surinam, 341
Copaibic acid, 342
Copaiva, 341
Copperhead snake, 518
Copra, 76
Coptine, 167
Coptis, 166
  trifolia, 166
Coral snake, 519
Coriander, fruit, oil, seed, 277
Coriandrol, 278
Coriandrum, 277
  sativum, 277
Cornaceæ, 359
Cornin, 360
Corn silk, starch, 80
Cornus, 359
  florida, 359
Corydaline, 180
Corydalis, 179
Cotton oil, 195
  plant, uses of, 198
Cottonseed oil, 195, 365
Cotton root bark, 195
  sterilized, 197
  wool, 195
Couch grass, 82
Coughwort, 462
Coumaric acid, 350
Coumarin, 350
Cow's milk, 508
Cradin, 111
Cramp bark, 444
Cranberry, mountain, upland, wild, 356
  tree, 444
Cranesbill, 204
Creosol, 108
Cresol, 108
Crocin, 72
Crocus, 71
  autumn, 56
  meadow, 56
  sativus, 71
Crosswort, 450
Croton oil, 259
Crotonol, 260
Crotonoleic acid, 260
Croton Tiglium, 259
Crow fig, 374
Crowfoot, 204
  Family, 158
Cruciferæ, 181
Crude opium, 174
  tetanus antitoxin, 515
Cryptogams, 28
Cryptopine, 177
Cubeb, 79
Cubeba, 121
Cubeb camphor, 122
Cubebin, 122
Cubeb oleoresin, 122
Cubebs, 121
Cucku buttons, 465
Cuckoo's-cap, 160
Cucurbitaceæ, 428
Cucurbita Pepo, 431
Cudbear, 21
Cullay, 317
Culver's root, physic, 405
Curcuma, 94
Curcuma Zedoaria, 93
Curled dock, 128
Cusso, 310
Cutch, 440
Cyanophyceæ, 9
Cycadaceæ, 29
Cymarin, 385
Cymene, 421
Cymol, 131
Cypress, 30
Cypripedium, 96, 97
  bulbosum, 96
  parviflorum, 96
  pubescens, 96
Cystine, 347
Cytisus scoparius, 335

D

Damiana, 484
Damianin, 485
Dandelion, 459
Daphne Gnidium, Mezereum, 303
Daphnin, 304
Datura Stramonium, 396
Daturine, 397
Deadly nightshade, 393
Dead Sea apple, 103
Death's herb, 393
Deer musk, 496
Delphinine, 159
Delphinium, 159
  Ajacis, 159
  Staphisagria, 158
Delphinoidine, 159
Delphisine, 159
Desiccated pituitary body, 512
Devil's apple, 145
  dung, 278
  trumpet, 396
  turnip, 432
Dewberry, 309
Dextrin, 85
Diacetyl morphine, 177
Diastase, 85
Diatomaceous earth, 9
Diatoms, 9
Dicentra canadensis, Cucullaria, 179
Dichrysarobin, 346
  -methyl-ether, 346
Dicotyledons, 49, 102
Digitalin, French, 407
  German, 408
  Nativelle's, 407
Digitalinum verum, 409
Digitalis, 55, 406
  purpurea, 406
Digitin, 409
Digitoflavone, 409
Digitoxin, 407
Dionin, 177
Dioscorea, 73
Dioscoreaceæ, 73
Dioscorea villosa, 73
Dipentine, 116
Diphtheria antitoxin, 513
  concentrated, 513
  refined, 513
Diosphenol, 216
Doftberry, 393
Dogbane Family, 382
Dog buttons, 374
  grass, 82
  poison, 374
Dogwood bark, flowering, 359
Dogwood Family, 359
Doll-cheese, 198
Dovefoot, 204
Draconin, 77
Dragon's blood, 77
Dried suprarenals, 509
Drosera anglica, longifolia, rotundifolia, 478
Droseraceæ, 478
Drug, 1
Drumstick tree, 337
Dryopteris Filix-mas, 25
  marginalis, 26
Dulcamara, 401
Dulcamarin, 402
Dwale, 393
Dwarf bay, 303
Dwarf palmetto, 78
Dwarf pine oil, 40
Dyer's moss, 21
  oak, 103

E

East Indian balmony, 371
Ecballium Elaterium, 430
Ecgonine, 213
Echinacea, 467
Écuelle process, 222
Edestin, 84
Egg albumen, fresh, 501
  fresh, white, yolk, 501
Elastica, 260
Elaterin, 430
Elaterinum, 430
Elecampane, 463
Elettaria Cardamomum, 91
Elf-dock, 463
Elm, American, Family, Indian, moose, red, rock, sweet, 117
Emetine, 435
Emodin, 127, 129, 253, 255, 256, 340, 346
Emodin-anthranol-methyl-ether, 346
  -methyl-ether, 346

Emulsin, 312, 316, 318
Epipremnum pinnatum, 487
Epinephrin, 510
Epinephrina, 509
Epinephrine, 509
Equisitales, 24
Equus, 513
  caballus, 518
Ergot, 16
Ergota, 16
Ergotamine, 19
Ergotoxin, 19
Ericaceæ, 356
Ericolin, 357, 358
Eriodictyon, 391
  californicum, 391
Erythræa, Centaurium, 372
Erythric acid, 21
Erythroxylaceæ, 212
Erythroxylon, 212
  coca, truxillense, 212
Eseramine, 328
Eseridine, 328
Essence of rose, 306
Ethylmorphine hydrochloride 177
Eubatus, 309
Eucalyptol, 288, 290, 296
Eucalypti gummi, 290
Eucalyptus globulus, 288
  gum, 290
  kino, 290
  rostrata, 290
Eudesmin, 291
Eugenol, 101, 141, 291, 292, 294, 295, 297 299
Euonymin, 251
Euonymus, 250
  atropurpureus, 250
Eupatorin, 451
Eupatorium perfoliatum, 450
Euphorbia, 267
Euphorbiaceæ, 257
Euphorbia hirta, 267
  pilulifera, 267
European goat's rue, 344
  raspberries, 319
  wormseed, 456
Evening trumpet flower, 377
Evernic acid, 21
Exogonium Jalapa, 386
Expiration date, 514, 516
Expressed oil almonds, 313
Eye-bright, 426

F

Face-in-hood, 160
Fagaceæ, 102
Fairy bells, cap, 406
  cheeses, 198
  fingers, gloves, thimbles, 406
False hellebore, 167
  valerian, 466
  winter's bark, 142
Fan palm, 78
Farfara, 462
Fel bovis, 505
Felt galls, 104
Feltwort, 410
Fenchone, 275
Fennel fruit, oil, seed, 274
Ferns, 24
Ferula Sumbul, 280
Feverwort, 450
Fibrillation, 409
Ficus, 109
  carica, 109
Fig, 109
Figs, Eleme, Greek, natural, pulled, 111
  Smyrna, 110
Figwort Family, 405
Filicales, 24
Filicic acid, 26
Finger-berry, 309
Fir, 30
Fish berry, 152
Flacourt Family, 245
Flacourtiaceæ, 245
Flannel-leaf, 410
Flax, 209
  Family, 208
  plant, uses of, 211
Flaxseed, 207
Flaxseed oil, 208
Flopdock, 406
Fœniculum, 274
  vulgare, 274
Food essentials, 500
  of the gods, 278
Foxglove, 406

Frangula, 254
Frangulin, 255
Frankincense, 32
Frasera carolinensis, 150
Fraxin, 367
Fraxinus Ornus, 366
Fresh apple juice, 320
Friar's cap, cowl, 160
Fringe tree bark, 368
Fucose, 14
Fucus, 13
  vesiculosus, 13
Fumariaceæ, 179
Fumitory Family, 179
Fungi, 9, 14, 15

G

Gadus morrhua, 498
Gagroot, 426
Galanga, 94
Galangal, 94
Galangin, 95
Galega, 344
  officinalis, 344
Galla, 103
Gall gnats, mites, 104
Gallow grass, 111
Gall wasp, 104
Galls, Aleppo, Mecca, Smyrna, Turkey, 103
Gallus domestica, 502
Gambir, 440
Gamboge, 185
  Family, 185
Gambogic acid, 186
Ganja, 111
Garcinia Hanburyi, 185
Garden chamomile, 454
  marigold, 458
  mint, 416
Garget, 132
Garlic, 64
Garnet apple, 300
Gauza, 111
Gelidium, 12
Gelsemine, 379
Gelseminic acid, 379
Gelseminine, 379
Gelsemium, 377
  sempervirens, 377
Geneserine, 328
Gentiamarin, 371
Gentian, 373
Gentiana lutea, 370
Gentian Family, 370
Gentianin, 371
Gentian, root, yellow, 370
Gentianaceæ, 370
Gentiopicrin, 371
Gentisin, 371
Geraniaceæ, 204
Geraniol, 225, 308, 353, 419
Geraniol acetate, 223
Geranium Family, 204
  maculatum, spotted, wild, 204
German chamomile, 455
Ginger, 88
  family, 88
Ginseng Family, 482
Gingerol, 90
Gitonin, 409
Globulins, 513
Glossary of botanical and zoological terms, 549
Glossary of medical terms, 529
Glycocholic acid, 506
Glycyramarin, 324
Glycyrrhiza, 323
Glycyrrhiza glabra var. typica, glandulifera, 323
Glycyrrhizin, 324
Gnoscopine, 177
Goa powder, crude, 345
Goat's rue, 344
  thorn, 328
Gold bloom, 458
Golden seal, 162
  shower, 337
Gold thread, 166
Goosefoot, 130
Goosefoot Family, 130
Gossypii cortex, 195
Gossypium herbaceum, purificatum, 195
Gourd Family, 428
Gowan, milk, witch, yellow, 459
Gramineæ, 80
Granataceæ, 300
Granatum, 300
Grass Family, 80
Graybeard, 368

Greek nuts, 315
Green endive, hellebore, 58
Grenadier, 300
Grindelia camporum, cuneifolia, squarrosa, 451
Grindeline, 452
Ground holly, 357
  lemon, 145
Guaiac, 63
  resin, 229
Guaiacic acid, 230
Guaiacol, 108, 230
Guaiaconic acid, 230
Guaiacum, 229
  officinale, sanctum, 229
Guapi bark, 206
Guarana, 239, 243
  bread, 239
Guaranine, 240
Guarea Rusbyi, 206
Guide to pronunciation, XIII
Gum acacia, Arabic, Senegal, 342
  Benjamin, 361
  benzoin, 361
  bush, 391
  camphor, 137
Gummosis, 343
Gum opium, 174
  plant, 391
Gumwood, 288
Guttiferæ, 185
Gymnosperms, 28

H

Hæmatoxylon, 336
  campechianum, 336
Hagenia abyssinica, 310
Hamamelidaceæ, 284
Hamamelidis cortex, folia, 284
Hamamelis bark, leaves, 284
  virginiana, 284
Hard rubber, 264
Hare-burr, 465
Hashish, 111
Heath Family, 356
Hedeoma, 417
  pulegioides, 417
Helmet flower, 424
Helonias, 63
Helonin, 63
Hematoxylin, 337
Hemlock, 30, 43
  fruit, 275
  gum, pitch, 43
  poison, spotted spruce, 275
Hemp, Canadian, black Indian, 384
Henbane, black, 397
Henbell, 397
Hepaticæ, 24
Hercules' club, 218
Heroine, 177
Hesperidin, 222, 225
Hesperidium, 222
Hevea, 260
  braziliensis, 261
High-bush cranberry, 444
Hinberry, 319
Hirudo, 494
  medicinalis, 494
Histamine, 19
Hoarhound, 423
Hog bean, 297
  gum, 328
Holly-leaf barberry, 144
Holy bark, 252
  ghost root, 281
Homochelidonine, 173
Honduras bark, 233
Honeysuckle Family, 444
Hooded willow-herb, 424
Hoodwort, 424
Hookworm, 421
Hops, 115
Hordeum decorticatum, 84
  vulgare, 84
Horehound, white, 423
Horse gowan, 455
  nettle, 402
Horsetails, 24
Huanuco coca, 212
Humulin, 116
Humulus, 115
  Lupulus, 115
Hydnocarpic acid, 246
Hydrangea, 321
  arborescens, 321
Hydrangin, 322
Hydrastine, 164
Hydrastinine, 164
Hydrastis, 162

Hydrastis, canadensis, 162
Hydrocotarnine, 177
Hydrocoumaric acid, 350
Hydrocyanic acid, 312
Hydrophyllaceæ, 391
Hydroquinone, 357
Hydrous wool fat, 530
Hygrine, 213
Hyoscine, 399
Hyoscipicrin, 398
Hyoscyamine, 395, 397, 398, 399
Hyoscyamus, 397
  niger, 398
Hypophysis sicca, 512

I

Iceland lichen, 22
  moss, 22
Igasuric acid, 376
Ignatia, 381
  amara, 381
Illicium verum, 272
Indian apple, 145
  berry, 152
  corn, 81
  dye, 162
  hemp, 111
  paint, 172
  physic, 384
  pink, 379
  poke, 58
  root, 482
  sage, 450
  shamrock, 66
  tobacco, 426
  turmeric, 162
Indigo, 347
  wild, yellow, weed, 346
Inee, 384
Infusorial earth, 9, 10
Insane root, 397
Insulin, 526
  determination of strength, 527
  method of manufacture, 526
  storage, 527
  strengths, 527
  unit, 527
Inula, 463
  Helenium, 463
Inulin, 83, 453, 460, 464, 466
Iodine, 499, 511
  poisoning, 82
Ionone, 69
Ipecac, Brazilian, Cartagena, Panama, Rio, 433
Ipecacuanha, 433
Ipecacuanhic acid, 435
Ipomea, 388
  resin, 389
Ipomœa, 388
  orizabensis, 388
Iridaceæ, 68
Iris, 68
  caroliniana, 70
  Family, 68
  florentina, 68
  germanica, 68
Irish daisy, 459
  moss, 10
Iris palida, 68
  versicolor, 70
Iron-bark tree, 288
Irone, 69
Iso-aconitine, 160
Iso-cholesterin, 521
Iso-emodin, 340
Iso-eugenol, 101
Isolichenin, 22, 23
Iso-pelletierine, 302
Iso-physostigmine, 328
Itchwood, 58

J

Jaborandi, Pernambuco, Maranham, 217
Jaborine, 217
Jacob's chariot, 160
Jalapa, 386
Jalapin, 388
Jalap, resin, Vera Cruz, true, 386
Jamaica ginger, 88, 89
  pepper, 296
Jamestown lily, 396
  weed, 396
Japanese agar, 11
  belladonna, 399
  gelatin, 11
Jasmin, Carolina, wild, yellow, 377
Jateorrhiza palmata, 149
Jaundice root, 162
Java pepper, 121

Jerusalem oak, tree, 130
Jervine, 58
Jesuit's balsam, 341
  bark, 436
Jimson weed, 396
Joe Pye, 450
Jordan almond, 313
Juglandaceæ, 472
Juglandic acid, 473
Juglans, 472
  cinerea, 472
Juniper, 30, 38
  berry, 38, 39
  camphor, 39
  oil, 38, 39
  tar oil, 45
Juniperus, 38
  communis, 38
  oxycedrus, 45
  Sabina, 30, 39

K

Kaempferid, 95
Kamala, 264
Kava, 123
Kava kava, 123
Kawa, 123
Kelp-ware, 13
King's consound, 159
  cure, 357
Kinnikinnic, 356
Kinoin, 291, 334
Kino, Indian, Malabar, 333
  red, 334
  -tannic acid, 291, 334
Knotty brake, 25
Kola, 190, 243
  nuts, 190
Kombic acid, 384
Kosin, 311
Kosotoxin, 311
Koussin, 311
Kousso, 310
Krameria, 325
  triandra, argentea, 325
Kramerio-tannic acid, 326

L

Labiateæ, 413
Lactose, 508
Lactosum, 508
Lactuca virosa, 461
Lactucerin, 462
Lactucarium, English, 461
  French, German, 462
Lactucic acid, 462
Lactucin, 462
Lactucon, 462
Lactucopicrin, 462
Lady laurel, 303
Lady's glove, 406
Lady slipper, 96
Lævo-methylaminoethanolcatechol, 509
Lamb mint, 413
Lanolin, anhydrous, 520
Lanthopine, 177
Lappa, 465
Lappin, 466
Larch, 30, 36
  agaric, 19
Lard, hog's, prepared, 500
Larix europœa, 36
Larkspur herb, 158
  seed, 159
Laudanine, 177
Laudanosine, 177
Lauraceæ, 134
Laurel Family, 134
  camphor, 137
Lavender oil, 418
Lavandula Spica, vera, 418
Lecanora Acharius, 21
Lecanoric acid, 22
Lecithin, 502
Leeches, green, speckled, 494
Leguminosæ, 323
Lemon juice, oil, peel, 221
Leontodon Taraxacum, 459
Leopard's-bane, 457
Leptandra, 405
Leptandrin, 406
Lettuce, acrid, opium, prickly, strong-scented, wild, 461
Levant storax, 286
  wormseed, 456
Lichen islandicus, 22
Lichens, 9, 20
Lichen starch, 22
Lichenin, 22, 23
Lichenoid, 22

Licorice root, 323
  Russian, Spanish, 323
Life root, 466
Lignum vitæ, 229
Liliaceæ, 51
Lily Family, 51
  May, of the valley, park, wood, 60
Limonene, 222, 419
Limonis cortex, 221
  succus, 221
Linaceæ, 208
Linalool, 228, 278, 353, 421
Linalool acetate, 223, 225
Linalyl acetate, 228, 419
  esters, 419
Linoleic acid, 269
Linseed, 208
  oil, 208
Linum, 208
  usitatissimum, 208
Lion's tooth, 459
Lipase, 505
Liquidambar orientalis, styraciflua, 286
Liquid storax, 286
Liquorice, 323
Liver, 505
Lobelia, 426
  inflāta, 426
Lobeliaceæ, 426
Lobelia Family, 426
Lobelic acid, 427
Lobelidine, 427
Lobeline, 427
Loganiaceæ, 374
Loganin, 376
Logwood, Jamaica, Honduras, Santo Domingo, 336
Lordwood, 286
Love-in-winter, 357
Liverworts, 24
Lupulin, 115, 116
Lupulinum, 115
Lycopodiales, 24
Lycopodium, 26
  clavatum, 26

M

Mackerel mint, 416
Macrotys, 165
Mad apple, 103
Madder Family, 433
Madweed, 424
Mahonia, 144
Male fern, 25
  jalap, 388
Malic acid, 348
Mallotus philippinensis, 264
Mallow, common, dwarf, 198
  Family, 192
  high, leaves, low, running, 198
Malnutrition, 499
Malt, 84
  extract, 85
Malting, 84
Maltose, 84, 505
Maltum, 84
  hordei, 84
Malvaceæ, 192
Malvæ folia, 198
Malva, rotundifolia, sylvestris, 198
Manaca, 403
Mandrake, 145
Manicine, 403
Manna, 366
Mannite, 367, 462
Mantle galls, 104
Marble flower, 174
Marigold, garden, 458
Marrubiin, 423
Marrubium, 423
  vulgare, 423
Marsdenia Condurango, 470
Marsh elder, 444
  mallow leaves, root, 192
Mary-bud, 458
Maryland pink, 379
Mastic, "gum," 236
Mastiche, 236
Masticic acid, 237
Masticin, 237
Mastix, 236
Maté, 243
Materia medica, 1
Matico, 122
Matricaria, 455
  Chamomilla, 455
Maw seed, 177
  poppy, 174
May apple, 145
Meadow anemone, 168

Meadow saffron, 56
Meconic acid, 177
Meconidine, 177
Mekilwort, 393
Melaleuca Leucadendron var. Cajeputi, var., minor, 295
Meliaceæ, 206
Melilotic acid, 350
Melilotus, 349
  officinalis, 349
Melilot, yellow, 349
Menispermaceæ, 149
Menispermine, 153
Mentha piperita, 413
  spicata, viridis, 416
Menthol, 413, 414, 415
Menthyl acetate, 414
Meth-oxy-cinnamic acid, 406
Methyl alcohol, 45
  arbutin, 357
  chavicol, 299
  coniine, 276
  eugenol, 297, 299, 353
  pelletierine, 302
  protocatechuic aldehyde, 100
  salicylate, 248
Methysticin, 124
Methysticum, 123
Mexican scammony root, 388
Mezerein, 304
Mezereon Family, 303
Mezereum, 63, 303
Milk-curdling enzyme, 506
Milk gowan, 459
  sugar, 508
  weed, 384
Milkweed Family, 469
Milkwort, 393
  Family, 247
Mint, brown, 416
  Family, 413
  garden, mackerel, 416
Mitchella, 441
  repens, 441
Monimiaceæ, 170
Monkshood, 160
Monocotyledons, 49, 50
Moonseed Family, 149
Moorgrass, 478
Moraceæ, 109
Morning-glory Family, 386
Morphine, 177
Morrhuine, 499
Moschus, 496
  moschiferus, 496
Mosquito plant, 417
Mosses, 24
Mossing (cinchona), 438
Mountain balm, 391
Mountain box, 356
  flax, 247, 372
  tobacco, 457
Mulberry Family, 109
Mullein dock, 410
  flowers, leaves, 410
Murillo bark, 317
Musci, 24
Musk, Chinese, deer, 496
  root, 280
  Thibet, Tonquin, 496
Mustard, black, 182, 183
  brown, 183
  Family, 181
  oil, 183
  white, yellow, 181
Mutton suet, 507
Myrcen, 116
Myrcene, 299
Myrica, 476
  cerifera, 476
Myrcia oil, 299
Myricaceæ, 476
Myricin, 493
Myricinic acid, 477
Myricyl alcohol, 493
Myricyl palmitate, 493
Myristica, 154
Myristicaceæ, 154
Myrosin, 182, 183
Myrrh, 234
Myrrha, 234
Myrrh Family, 234
Myrrhin, 235
Myrtaceæ, 288
Myrtle Family, 288

N

Narceine, 177
Narcotine, 177
Nativelle's digitalin, 407

Naval stores, 31
Nearctic crotalidæ, 518
Nectandrine, 152
Nepeta Cataria, 425
Nerol, 225
Nettle potato, 265
Nibs (cacao), 188
Nicotine, 114, 276
Night-blooming cereus, 474
Nightshade Family, 393
North American anti-snake-bite serum, 518
Northern pine, 46
Norway spruce, 42
Nuclein, 502
Nutgall, 103
Nutmeg, 154
  Family, 154
Nutritional diseases, 499
Nux vomica, 374
  Family, 374
  Bombay, Cochin, Ceylon, Madras, 376

O

Oak-red, 103
Oat, 83
Oatmeal, 84
Oil, almonds, expressed, 313
  anise, 272
  bay, 299
  bergamot, 227
  birch tar, rectified, 107
  bitter almonds, 315
    essential, 315
  cade, 45
  cajuput, 295
  caraway, 270
  cardamom, 91
  cassia, 137
  chenopodium, 130
  cinnamon, 137
  dwarf pine, 40
    needles, 40
  hemlock, 44
  juniper, 38, 39
  lavender, 418
  lemon, 221
  mustard, 183
    volatile, 183
  myrcia, 299
Oil neroli, 224
  nutmeg, 154
  orange, 226
    bitter, 224
  orange, flowers, 224
  peppermint, 413
  pimenta, 296
  rose, 306
  rosemary, 419
  santal, 79
  sassafras artificial, 141
  savin, 39
  spearmint, 416
  spruce, 44
  tar, rectified, 48
  theobroma, 187
  thyme, 420
  turpentine, 31, 37
    rectified, 37
Old Man's bread, 368
Oleaceæ, 364
Olea europæa, 364
Olein, 499, 501, 507
Oleoresin turpentine, 32
Oleum amygdalæ amaræ, 315
    expressum, 313, 315
  aurantii, 226
    amari, 224
    florum, 224
  bergamottæ, 227
  betulæ empyreumaticum rectificatum, 107
  cadinum, 45
  cajuputi, 295
  cardamomi, 91
  cari, 270
  chaulmoogræ, 245
  chenopodii, 130
  cinnamomi, 137
  eucalypti, 288
  fœnicului, 274
  gossypii seminis, 195
  jecoris aselli, 498
  lavandulæ, 418
  limonis, 221
  lini, 208
  menthæ piperitæ, 413
    viridis, 416
  morrhuæ, 498
  myrciæ, 299

Oleum myristicæ, 154
  picis rectificatum, 48
  pimentæ, 296
  pini pumilionis, 40
  ricini, 257
  rosæ, 306
  rosmarini, 419
  sabinæ, 39
  santali, 354
  sassafras, 140
  sesami, 268
  sinapis volatile, 183
  theobromatis, 187
  thymi, 420
  tiglii, 259
Olive Family, 364
  oil, 364
Onaye, 384
Ophelic acid, 372
Opium, 174
  poppy, 174
Orange flowers, oil, 224
  flower water, 225
  peel, bitter, 224
    sweet, 226
  root, 162
  swallow-wort, 469
Orchidaceæ, 96
Orchid Family, 96
Orcin, 22
Ordeal bean, 326
Oregon grape, 144
Oriental sweetgum, 286
Orizaba jalap root, 388
Orris, 68
  butter, 69
  root, 68
Orsellic acids, 21, 22
Otto of rose, 306
Ourouparia gambir, 440
Ovies aries, 507, 520
Ovi albumen recens, 501
  vitellum recens, 501
Ovomucoid, 502
Ovovitellin, 502
Ovum gallinaceum, 501
Oxadoddy, 405
Ox bile, 505
Ox-eye, 167
Oxgall, 505
Oxyacanthine, 145
Oxynarcotine, 177

P

Palmæ, 75
Palm Family, 75
  ferns, 29
Palmitic acid, 493, 498
Palmitin, 499, 501, 507
Palm wine, 76
Panama bark, 317
Pan-cake plant, 198
Pancreas, 504
Pancreatin, 504
Pancreatinum, 504
Papaveraceæ, 172
Papaveramine, 177
Papaverine, 177
Papaver somniferum, 174
Papoose root, 147
Paradise plant, 303
Paramenispermine, 153
Pareira, 151
  brava, 151
Parillin, 62
Parmeliaceæ, 21
Parmelia Family, 21
Partridge berry, 441
Pasque flower, 168
Passiflora, 480
  incarnata, 480
Passifloraceæ, 480
Passion flower Family, 480
  vine, 480
Paullinia Cupana, 239
Peanut oil, 365
Pearl moss, 10
Pedaliaceæ, 268
Pellagra, 524
Pelican flower, 351
Pelletierine, 302
  tannate, 302
Pellitory root, 453
Pelosine, 152
Pennyroyal, 417
Pepper, 119
  African black, 119
  black, 119
  African, bird, Cayenne, cockspur, red, Spanish, 400

Peppercorn, 119
  Family, 119
  tailed, 121
Peppermint camphor, 413
  oil, 413
Pepo, 431
Pepsin, 503
  porous, spongy, 503
Pepsinum, 503
Peptase, 85
Peptones, 505
Persio, 21
Peruvian bark, red, 436
Pettymorrel, 482
Phæophyceæ, 9
Phanerogams, 28
Pharmacognosy, definition, 1
Pheasant's eye, 167
Phellandrene, 41, 222, 299
Phenyl-propyl-cinnamate, 362
Phosphoglyceric acid, 502
Phosphorus, 499
Phycomycetes, 15
Physeter macrocephalus, 497
Physostigma, 326
  venenosum, 326
Physostigmine, 328
Phytolacca, 132
  Americana, 132
Phytolaccaceæ, 132
Phytolaccic acid, 133
Picraconitine, 160
Picramnia, 233
Picrasma excelsa, 231
Picrasmin, 232
Picro-crocin, 72
Picro podophyllin, 146
Picrotoxin, 153
Pieplant, 126
Pill-bearing spurge, 267
Pilocarpine, 217
Pilocarpus, 217
  Jaborandi, 217
  microphyllus, 217
Pimenta, 296
  acris, 299
  officinalis, 296
Pimento, 296
  oil, 296
Pimpinella Anisum, 272
Pinaceæ, 30
Pine, 30
  Georgia, hard, longleaf, pitch, Southern, yellow, 32
Pinene, 37, 39, 40, 41, 421
Pine needle oil, 40
Pine tar, 44, 46
Pink, Carolina, Indian, Maryland, 379
Pinkroot, 379
Pinus alba, 46
  canadensis, 43
  montana, 40
  palustris, 32, 37, 41, 44
  pumilio, 40
  Strobus, 46
  tæda, 32
Piper, 119
Piperaceæ, 119
Piperidine, 121
Piperine, 121
Piper angustifolium, 122
  Cubeba, 121
  methysticum, 123
  nigrum, 119
Pipsissewa, 357
Pistacia lentiscus, 236
Pitch, 31
  common, 46
  group, 46
Pituitarium, 512
Pituitary, 512
Pit vipers, 518
Pix, 46
Pix burgundica, 42
  canadensis, 43
  liquida, 44
  nigra, 46
  pini, 44
Plant kingdom, divisions of, 6
Plasma, blood, 513
Pleurisy root, 469
Podophyllin, 146
Podophyllinic acid, 146
Podophylloquercetin, 146
Podophylloresin, 146
Podophyllotoxin, 146
Podophyllum, 145
Podophyllum peltatum, 145
Poke root, 132
  Family, 132

Poke weed, 132
Poison berry, 401
  black cherry, 393
  hemlock, 273, 275
  nut, 374
  parsley, 275
  tobacco, 397
Polygalaceæ, 247
Polygala Senega, 247
Polygalic acid, 248
Polygonaceæ, 125
Polyporus officinalis, 19
Pomegranate, 300
  bark, 300
  Family, 300
Poor man's treacle, 64
Poppy Family, 172
Poppyseed oil, 365
Populi gemmae, 201
Populus, 200
  balsamifera, 201
  candicans, 201
  nigra, 201
Posterior lobe (pituitary), 512
Potassium bitartrate, 348
  nitrate, 398
Pratensol, 349
Pratol, 349
Premna arborea, 487
Prepared cacao, 187
Prepared suet, 507
Prickly ash berry, 218
  cedar, 45
  fruit, northern, southern, yellow, 218, 219
  lettuce, 461
Priest's crown, 459
Prince's pine, 357
Pronunciation guide, XIII
Proteoses, 504
Protocatechuic aldehyde, 101
Protokosin, 311
Protopine, 173, 177
Protoveratridine, 58
Protoveratrine, 58
Prune, 318
Prunum, 318
Prunus Amygdalus Stokes var. amara, 315
Prunus Amygdalus dulcis, 313
Prunus domestica, 317
  virginiana, 311
Pseudojervine, 58
Pseudomorphine, 177
Pseudo-pelletierine, 302
Psychotrine, 435
Pteridophytes, 7, 24
Pterocarpus Marsupium, 333
Pterocarpus santalinus, 334
Ptyalin, 505
Pudding stick tree, 337
Pulsatilla, 168
  camphor, 169
  patens, 168
  pratensis, 168
  vulgaris, 168
Pulse Family, 323
Pumpkin seed, 431
Purging agaric, 19
  buckthorn, 255
  cassia, 337
  croton, 259
Punic apple, 300
Punica Granatum, 300
Punicine and compounds, 302
Purified cotton, 195, 196
Purshianin, 253
Pyrethrine, 453
Pyrethrum, 453
Pyrocatechin, 334
  methyl ester of, 230
Pyrus Malus, 320

Q

Quaker buttons, 374
Quassia, 150, 231
  amara, 231
  cups, 232
  Family, 231
  Jamaica, Surinam, 231
Quassiin, 232
Queen's delight, 265
  root, 265
Quercetin, 357, 441
Quercin, 103
Quercitannic acid, 103, 306
Quercus, 102
  alba, 102
  infectoria, 103
Quillaja, 317

Quillaja, Saponaria, 317
  sapotoxin, 317
Quillajic acid, 317
Quinamine, 439
Quinic acid, 439
Quinidine, 439
Quinine, 438, 439
Quitch, 82

R

Ragwort, 466
Ranunculaceæ, 158
Raspberry, black caps, European, red, red caps, 319
Rattlesnake, 518
  root, 247
Rattle-top, 165
Ratsbane, 374
Red clover blossoms, 348
  gum, 290
  indigo, 21
  pepper, 400
  puccoon, 172
  raspberries, 319
Redroot, 172
Red sandalwood, 334
  santalwood, 334
  saunders, 334
Rennet, 506
Rennin, 506
Renninum, 506
Resin, 31, 34, 41
Resina jalapæ, 386
  nigra, 46
  pini group, 42
Rhabarberon, 127
Rhamnaceæ, 252
Rhamnus cathartica, 255
  Frangula, 254
  Purshiana, 252
Rhatany, Brazilian, Para, Peruvian, 325
Rhein, 127
Rheo-tannic acid, 127
Rheum, 125
Rheumatism Root, 73
  weed, 384
Rheum officinale, 125
  palmatum, 125
Rhodophyceæ, 9, 10
Rhœadine, 177
Rhubarb, 125, 367
  Chinese, 125
  Turkish, 125, 127
Rhus glabra, 237
Ricin, 258
Ricinolein, 258
Ricinus communis, 257
Rickets, 499
Rocella, 21
Rocky Mountain grape, 144
Roman chamomile, 454
Rosa, 305
Rosaceæ, 305
Rosa alba, 307
  centifolia, 307
  Damascena, 307
  gallica, 305
Rose elder, 444
  Family, 305
Rosemary oil, 419
Rose; Dutch, French, Red, 305
Rose water, stronger, 308
Rosin, 41
  oil, heavy, 42
  oil, light, 42
Rosmarinus officinalis, 419
Rottlera, 264
Rubber, 260
  India, 260
  Para, 260
Rubiaceæ, 433
Rubi Idæ fructus, 319
Rubijervine, 58
Rubus, 309
  canadensis, trivialis, 309
Rubus Idæus, 319
Ruby wood, 334
Rue Family, 215
Rum cherry, 311
Rumex, 128
  crispus, 128
  obtusifolius, 128
Rusbyine, 207
Russian flies, 488
Rutaceæ, 215
Rye smut, 16

S

Sabal, 78
Sabina, 30
Sabinol, 40

Saccharomyces, 15
  cerevisiæ, 16
Saccharum, 85
  lactis, 508
  officinarum, 85
  purificatum, 85
Sacred bark, 252
Saffron, 71, 150
  Spanish, 71
Safrol, 141
Sage, garden, meadow, 422
Saint Ann's bark, 436
Saint Ignatius bean, 381
Salicaceæ, 200
Salicin, 200
Salicinum, 200
Salix, 200
Saloop, 140
Salt rock moss, 10
Salvia, 422
  officinalis, 422
Sambucus, 446
  canadensis, 446
  nigra, 446
Sandalwood Family, 354
  oil, white, 354
Sangrel, 357
Sanguinaria, 172
  canadensis, 172
Sanguinarine, 173
Sanguis draconis, 77
Santalaceæ, 354
Santalal, 355
Santalic acid, 335
Santalin, 335
Santalol, 355
Santalum album, 354
  rubrum, 334
Santalwood, oil, white, 354
Santonica, 456
Santonin, 456, 457
Santoninum, 456
Sapindaceæ, 239
Saponin, 67
Sarsaparilla, 61
  Central American, 62
  Honduras, 61
  Jamaica, 62
  Mexican, 61
Sarsa-saponin, 62
Sassafras, 63, 140
  camphor, 141
  medula, 140
  pith, 140
  variifolium, 140
Savin, 30
Saw palmetto, 78
Saxifragaceæ, 321
Saxifrage Family, 321
Scammonia radix, 389
Scammony resin, 390
  root, 389
Scilla, 54
Scillin, 55
Scillipicrin, 55
Scillitoxin, 55
Scoparin, 336
Scoparius, 335
Scopola, 399
  Carniolica, 399
Scopolamine, 395, 397, 398, 399
Scrophulariaceæ, 405
Scrub palmetto, 78
Scullcap, blue, 424
Scuttellaria, 424
  lateriflora, 424
Scutellarin, 424
Sea ash, 218
  onion, 54
  wrack, 13
Secale cereale, 16
  cornutum, 16
Selenicereus grandiflorus, 474
Semen pedicularis, 158
Senecio, 466
  aureus, 466
Senega, 247
Senegin, 248
Senna, 367
Sennacrol, 340
Senna, leaves, Alexandria, Indian, Nubian, Tinnevelly, Tripoli, 338
  Mecca, 340
  Bombay, 340
  pods, 339
Serenoa serrulata, 78
Serpentaria, 351
Sesame oil, 268, 365
Sesamum indicum, 268
Seven-barks, 321

Serum, 513
Sevum, 507
  præparatum, 507
Shaving (Cinchona), 438
Shavings tree, 368
Sheep berry, 445
Shoemake, 237
Silver-grain (cochineal), 491
Silver leaf, 265
Simarubaceæ, 231
Sinalbin, 182
Sinapine sulphate, 182
Sinigrin, 183
Sinapis alba, 181
  nigra, 183
Sleeping nightshade, 393
Slippery elm, 117
Smilacin, 62
Smilax medica, 61
  officinalis, 61
Smilax ornata, 62
Snakeroot, Canada, 352
Snakeroot, 247
  Seneca, 247
  Senega, 247
  Virginia, 351
  Texas, 351
Snapping hazelnut, 284
Snowball bush, 444
Soapbark, 317
Soapberry Family, 239
Solanaceæ, 393
Solanine, 402
Solanum, 402
  carolinense, 402
  dulcamara, 401
Soldier plant or tree, 122
Solid galls, 104
Sophorine, 347
Spanish chamomile, 453
  flies, 488
  pellitory, 453
  pepper, 400
Sparteine, 336
Spearmint, oil, 416
Spermaceti, 497
Spermatophytes, 8, 28
Sperm whale, 497
Sphacelic acid, 19
Sphacelotoxin, 19
Spigelia, 379
  marilandica, 379
Spigeline, 380
Spignet, 482
Spindle Tree, 250
Spoonwood, 264
Sporophytes, 28
Spotted cowbane, 275
Spotted hazel, 284
Spruce, 30
Spurge Family, 257
  flax, 303
  laurel, 303
Spurred rye, 16
Squaw bush, 444
Squawmint, 417
Squaw root, 147, 165
Squawvine, 441
Squawweed, 466
Squill, 54
  red, 54
  white, 54
Squirrel corn, 179
Stafftree Family, 250
Staggerweed, 159
St. Andrew's lace, 111
Staphisagria, 158, 159
Staphisagrine, 159
Starbloom, 379
Starch, 80, 84
Stargrass, 63, 65
Stavesacre, 158
Steapsin, 504, 505
Stearin, 501, 507
Sterculiaceæ, 187
Stercus diaboli, 278
Stigmata maydis, 80
Stillingia, 265
  sylvatica, 265
Stillingine, 266
Stinking nightshade, 397
Stink weed, 396
Stone oak, 102
Storax, American, levant, liquid, 286
Storesin, 287
Stork's bill, 204
Strobile, 115, 116
Stramonium, 396, 398
Stronger rose water, 308
Strong-scented lettuce, 461

Strophanthin, 384
Strophanthus, 55
  Kombe, 382
  hispidus, 382
  seed, 382
Strychnine, 376, 381
Strychnos Ignatii, 381
Strychnos Nux-vomica, 374
Styracaceæ, 361
Styraceæ, 361
Styracin, 332, 362
Styrax, 286
Styrax Benzoin, 361
  Family, 361
Styrol, 332, 362
Succus pomorum, 320
Sucrose, 85
Sucrosum, 85
Sudan coffee, 190
Sugar, beet, cane, refined, 85
Sulphur, 499
Sumac, 237
Sumach, 237
  dwarf, family, mountain, scarlet, sleek, smooth, upland, 237
Sumbul, 280
Sundew, 478
  Family, 478
Sunflower seed oil, 365
Suprarenalin, 509
Suprarenalum siccum, 509
Suprarenin, 509
Sus scrofa var. domesticus, 500, 504
Sweating plant, 450
Swedish moss, 21
Sweet almond, 313
  cider, 320
  lucerne, 349
  oil, 364
Sweetroot, 323
Sweet-scented cactus, 474
Sweet slumber, 172
  viburnum, 445
Sweetweed, 192
Sweetwood, 323
Swertia Chirayita, 371

T

Tailed pepper, 121
Tallow bayberry, 476
Tallow shrub, 476
Tamarind, 347
Tamarindus, 347
  indica, 347
Tanner's oak, 102
Tar, 31
Taraktogenos Kurzii, 245
Taraxacerin, 460
Taraxacin, 460
Taraxacum, 459
Tar group, 44
Tarweed, 391
Taurocholic acid, 506
Tea, black, green, 241, 242
Teel oil, 268
Terebene, 38
Terebinthina, 32
  canadensis, 35
  laricis, 36
Terpineol, 225, 296
Terpin hydrate, 38
Terra Japonica, 440
Tetanus antitoxin, 515
  toxin, 517
Tetterwort, 172
Thallophytes, 6, 9
Thebaine, 177
Theaceæ, 241
Thea sinensis, 241
Theobroma cacao, 187
Theobromine, 189, 190, 240, 244
Theophylline, 189, 244
Thibet musk, 491
Thornapple, 396
Thoroughwort, 450
Thread-leaf, 402
Throatwort, 406
Thuja, 48
  occidentalis, 48
Thyme, garden, mother of, oil, 420
Thymeliaceæ, 303
Thymol, 420, 421
Thymus, 420
  vulgaris, 420
Thyroid, gland, 510
Thyroideum, 510
  siccum, 510
Thyroxin, 510
Tickleweed, 58
Tickweed, 417

Tiglic acid, 260
Tobacco, Indian, wild, 426
Tolu, balsam, resin, 332
Toluifera Balsamum, 332
  Pareiræ, 330
Tonga, 487
Tonka, 100
Tonquin musk, 496
Toothache tree fruit, 218
Toxin, diphtheria, 513, 514
Tragacantha, 328
Tragacanth, 328
  gum, 328
Trailing mahonia, 144
Trifolium, 348
  pratense, 348
Trillium, 66
  erectum, 66
Trimethylamine, 499
Triticin, 83
Triticum, 82
Tritopine, 177
True jalap, 386
Truxillo coca, 212
Trypsin, 504, 505
Tsuga Canadensis, 43
Turkey corn, 179
Turkestan wormseed, 456
Turmeric, 150
Turnera, 484
  diffusa, aphrodisiaca, 484
Turneraceæ, 484
Turner Family, 484
Turpentine, 31, 32
  Canada, 35, 36
  oil, 37
  larch, Venice, 36
Tussilago Farfara, 462
  leaves, 462
Tyramine, 19

U

Ulexine, 347
Ulmus, 117
  fulva, 117
Ulmus fulva, 117
Umbelliferæ, 270
Umbrella plant, 145
Unicorn, false, 63
  root, 65
Universe vine, 356
Uva ursi, 356

V

Valeriana, 448
  officinalis, 448
Valerianaceæ, 448
Valerian, cat's, common, garden, wild, 448
  Family, 448
Valeric acid, 445, 446. 449
Valet dock, 463
Vanilla, 98
  aromatica, 98
  bean, 98
  Brazilian, 100
  Bourbon, 100
  cactus, 474
  fruit, 98
  Mauritius, 100
  Mexican, 100
  planifolia, 98
  Venezuelan, 100
  Vera Cruz, 100
Vanillin, 100, 101, 279, 332, 333
Vegetable antimony, 450
  calomel, 146
  mercury, 403
  sulphur, 26
Velvet plant, 410
Vengay, 333
Venice turpentine, 36
Venom, snake, 518, 519
Venus' Shoe, 96
Vera Cruz jalap, 386
Veratrine, 58
Veratroidine, 58
Veratrum. false, swamp, viride, 58
Verbasci flores, folia, 410
Verbascum phlomoides, 411
  thapsiforme, 411
  thapsus, 411
Verbenaceæ, 486
Verbena Family, 486
Veronica virginica, 405
Verosterol, 406
Viburnin, 445, 446
Viburnum opulus, 444
Viburnum opulus var. americanum, 444

Viburnum prunifolium, 445
Villosin, 309
Vinegar tree, 237
Virginia poke, 132
  snakeroot, 351
Vitamine, 16
Vitamine assay for A and D, 525
Vitamines A and D, 499
Vitamines A, B, C, 502
Vitamines, 522–525
  oil-soluble A and D, 523
  water-soluble B and C, 524
  water-soluble, 223
Vitellin, 502
Vouacapoua Araroba, 345
Vulcanizing, 262, 264

W

Wahoo, 250
Wake robin, 66
Walnut Family, 472
Water elder, 444
Waterleaf Family, 391
Water moccasin, 518, 519
Wax berry, 476
  myrtle, 476
  white, 492
  yellow, 492
Welsh parsley, 111
Weymouth pine, 46
Whig plant, 454
White agaric, 19
  beeswax, 492
  cinnamon, 142
  endive, 459
  flag, 68
  mallow, 192
  mustard, 181
  oak, 102
  of egg, 501
  pine, 46
  poppy, 174
Whorlywort, 405
Wild black cherry, 311
  chamomile, 455
  cherry, 311
  cotton, 384
  ginger, 352
  hyacinth, 179
Wild, indigo, 346
  lemon, 145
  lettuce, 461
  pepper, 303
  saffron, 56
  tobacco, 426
  woodbine, 377
  yam, 73
Willow Family, 200
Winterbloom, 284
Witch gowan, 459
  grass, 82
  hazel Family, 284
Wolfsbane, 160
Wolf's bane, 457
Wolf-grape, 401
Wood charcoal, 202
Woody nightshade, 401
Wool fat, hydrous refined, 520
Wormgrass, 379
Wormseed, 379
  Aleppo, Alexandria, European, Levant, Turkestan, 456
Wymote, 192

X

Xanthoxyli fructus, 218
Xanthoxylin, 219
Xanthoxyline, 219
Xanthoxylum. (See Zanthoxylum), 218

Y

Yam Family, 73
Yaw root, 265
Yeasts, 15, 16
Yellow beeswax, 492
  dock, 128
  eye, 162
  gowan, 459
  hercules, 218
  Indian shoe, 96
  melilot, 349
  milk-weed, 469
  moccasin flower, 96
  Noah's ark, 96
  puccoon, 162
  root, 162
  rosin, 41
  sweet clover, 349

Yerba santa, 391
Yew, 30
Yolk of egg, 501
Youthwort, 478

Z

Zanthoxylum americanum, 218
Zanthoxylum Clava—Hercules, 218
Zea, 80
Zea Mays, 80
Zedoaria, 93
Zedoary, 93
Zingiber, 88
Zingiberaceæ, 88
Zingiber officinale, 88
Zygophyllaceæ, 229